

WAR TODAY  
East versus West

# THE MACHINERY OF DESTRUCTION



The technological hardware  
of the future



# THE MACHINERY OF DESTRUCTION

If ever conflict should break out between the titans of East and West, a holocaust of lethal weapons will be let loose on soldiers and civilians alike the world over. Many of these weapons are as yet untried and untested in live combat. Others have, however, seen action in those parts of the world where the ideological battlefronts of East and West spark and flare into conflict. During this process both sides are provided with a useful insight into the efficiency of their progress in military technology.

*The Machinery of Destruction* takes a look at the sharp end of the East-West confrontation. What do the missiles we constantly read and hear about actually do? How do the fighter planes of each side's forces stack up against each other? Who might win a battle at sea?

Copiously illustrated with color and black and white photographs plus additional statistical diagrams, *The Machinery of Destruction* is a compelling analysis of the military might of the superpowers and their allies.

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East versus West

# THE MACHINERY OF DESTRUCTION

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# INTRODUCTION

If a third world war breaks out on European soil, it would involve alliances which are the basis of the two existing blocs: the Warsaw Pact and NATO. Immediately, East and West would throw all their enormous resources of men and materials into conflict. On every front, the latest and most exotic electronic and technical equipment would be committed.

The progress made in aerial and naval warfare during the last 25 years has been so enormous that the weapons used in World War 2 are now completely out-of-date. At that time, radar which was still in its infancy was received by the military with rapturous excitement. Now, the level of sophistication of the detection and guidance systems leave the machines of the forties among the antiques of the Middle Ages.

Today, each side tries to obtain a theoretical supremacy in the air and on the sea: theoretical because all the available figures only give partial comparisons. In fact, if it were possible to count all the fighters, bombers, aircraft carriers, submarines and so on, it is difficult to compare the other, equally important, data relating to the quality of the armaments, the efficiency of the soldiers and the cohesion of the commands, to name but some of the factors.

What exactly will be the offensive value of a good fighter aircraft if its pilot can only make use of some of its possibilities? What use is a good navy if its interservices organisation is weak? If the third world war breaks out, there will not be a general rehearsal; it is virtually impossible to be sure about the level of the respective Warsaw Pact or NATO powers. However, with regard to numbers, the Soviets are pushing ahead with filling the gap which separates them from the West in naval and aviation equipment.

NATO while allowing Russia to match the West in power has not yet been overtaken. The balance seems to be preserved, but for how long? At the moment the Atlantic Alliance's numerical inferiority is compensated for by technical superiority.

The outcome of a global conflict remains completely unpredictable. But one thing is certain: if the Soviet Union and the Warsaw Pact countries wants to win a war in Europe by conventional means they must do so soon. Time seems to be on the side of NATO. In fact, in the event of a prolonged struggle, the arrival of reinforcements from the U.S., a new element to the war, would upset the balance of forces in the European theatre.







# MILITARY AIRCRAFT

## WARSAW PACT VERSUS NATO

### The new lords of the skies

*Today, military aircraft wield incredible power. Strategic bombers, attack fighters or interceptors: each type possesses a formidable arsenal. The pilots who are today's 'lords of the skies' are true technicians, using electronics to perfection. On the level of tactical aircraft, the Warsaw Pact and the Atlantic Alliance stand on equal terms; the technical superiority of the West is matched by the greater number of aircraft in the East.*



*Top, left Soviet Ka-25 B Hormone helicopter. Above A French Atlantic Breguet. Below Part view of the inside of the cockpit of an American F-15. The pilot always wears his oxygen mask.*







*Above* A Grumman F-14A Tomcat ready to launch from USS Nimitz.



*Above* A Soviet Mig-23. *Below* Two Corsairs at the moment of take-off.





# THE AIRPOWER OF THE WARSAW PACT

Within the framework of the Soviet military organisation, the Air Force comes fourth behind the Strategic Rocket Forces (ICBM), the Army and the P.V.O.S. (Protivo Vozdouchnaya Oborona Strany), the National Air Defence Command. The Soviet Navy is relegated to fifth place. The Russians, however, do not underestimate the importance of the Air Force.

The Soviet Air Force has been completely renewed during the past ten years. Its defensive role has been transformed into a real offensive capability. A similar change has been made by the air forces of the other Warsaw Pact powers (Poland, Czechoslovakia, Hungary, East Germany, Rumania and Bulgaria), which are almost exclusively equipped with Soviet aircraft.

## Towards mastery of the skies

Russian air power is so great that the other countries of the East would seem to be merely an appendix. The thousands of Soviet aircraft are divided into five types. The first depends directly on the air force. It is a strategic unit of front line aircraft and transport planes. The second and third groups belong operationally to the national Air Defence Forces. The fourth category consists of territorial defence and fighters, and the fifth is attached to the Soviet Navy.

Recent all-embracing reorganisation, which has broken away from the air force command, has already resulted in a considerable increase in the Soviet air potential. Combat tactics and training programmes have also developed widely and independence and initiative remain among the qualities required of the pilots.

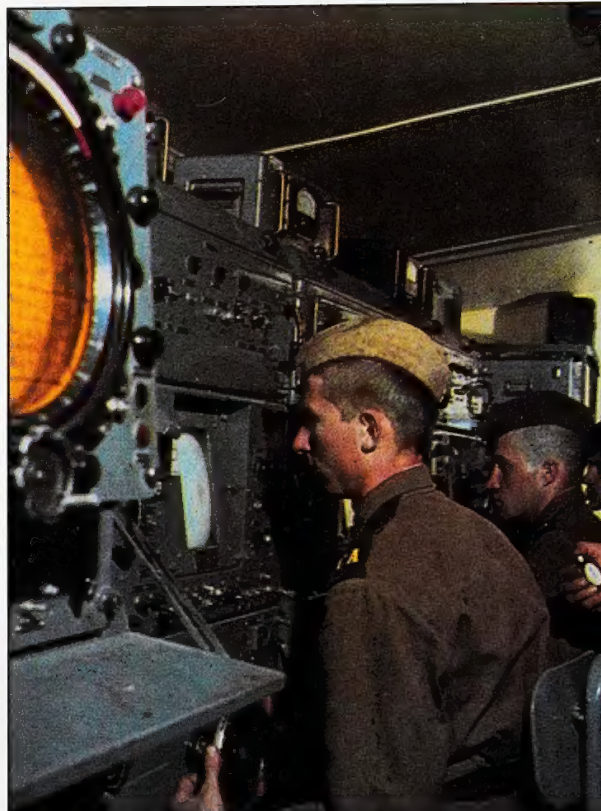
The continuous increase in the technological level of the aircraft means that their efficiency is also increasing to the point of being ready for a major conflict.

The past superiority of the NATO forces therefore comes into question; but the tactical balance still survives. The West more than matches its numerical weakness by sophisticated electronic equipment and by modern fighter planes. The USSR continues to modernize its equipment by preparing a new generation of machines which will be coming into operation in 1985. If NATO does not take appropriate counter-measures, the Warsaw Pact will have gained mastery of the skies by the mid 1990s. At present the Soviets have available in the satellite countries about 200 bases, some of which are used exclusively by them.

## STRATEGIC BOMBERS

The strategic component of the Soviet Air Force is impressive. It is spear-headed by 143 long-range bombers which can carry the threat of nuclear attack to any country in the world, and by 650 medium-range bombers which directly threaten the whole of Europe. We have earlier given details of characteristics and performance of these giants of the air.

The ageing Tu-95 *Bear* still constitutes a threat to North American territory. This machine, the largest of the Soviet bombers, could be aided in any intercontinental



Above Soviet soldiers watch over their air space.

missions by *Bison*, now modified as a tanker. A more recent model is *Backfire*, which can be used in the European theatre as well. It can carry a heavier load than the medium *Badger* and *Blinder* bombers.

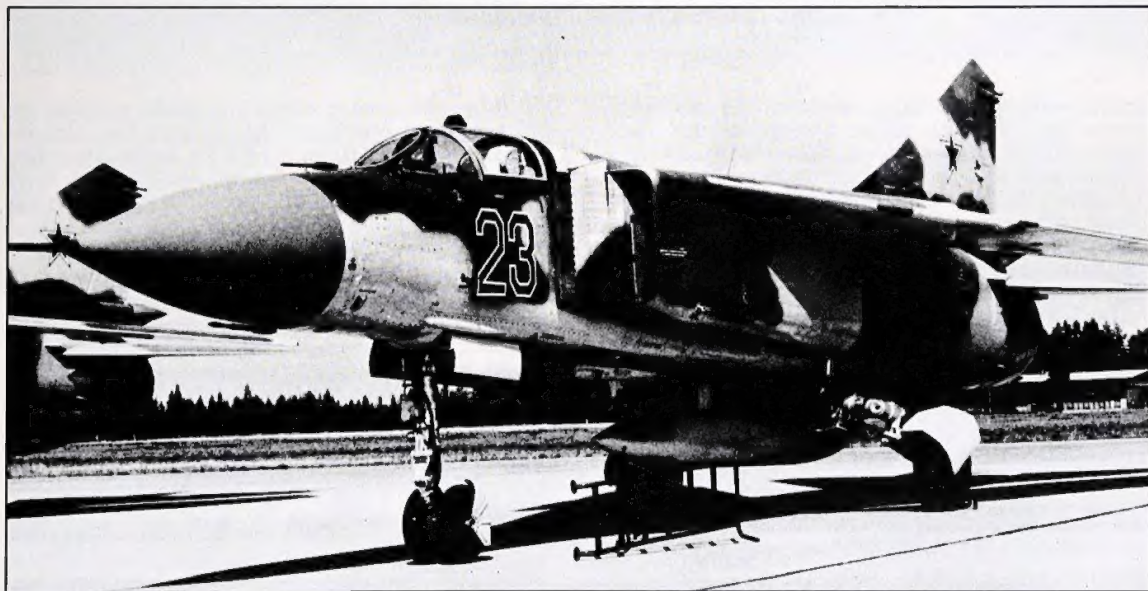
*Backfire*, can also penetrate anti-aircraft defences due to its ability to fly subsonically at a very low altitude. The Russians are at the moment developing a new strategic bomber, to be known as *Blackjack*. This machine, which should be in service during 1987, is a variable geometry design which will have a very wide range of action, be capable of reaching supersonic speeds at a great height, and will be able to penetrate defences at low altitude in sub-sonic flight.

This formidable strategic aircraft, to be equipped with air-to-ground missiles, can be refuelled in flight; details will be found in a subsequent paragraph. It will also be observed that aircraft of the *Badger*, *Bear* and *Blinder* types can carry out either counter-electronic sorties or reconnaissance. The USSR is the only country among the Warsaw Pact powers to be equipped with these bombers.





*Above* A MiG-23 Flogger B, being overhauled by Soviet technicians. *Below* A MiG-23 of the Soviet Air Force.



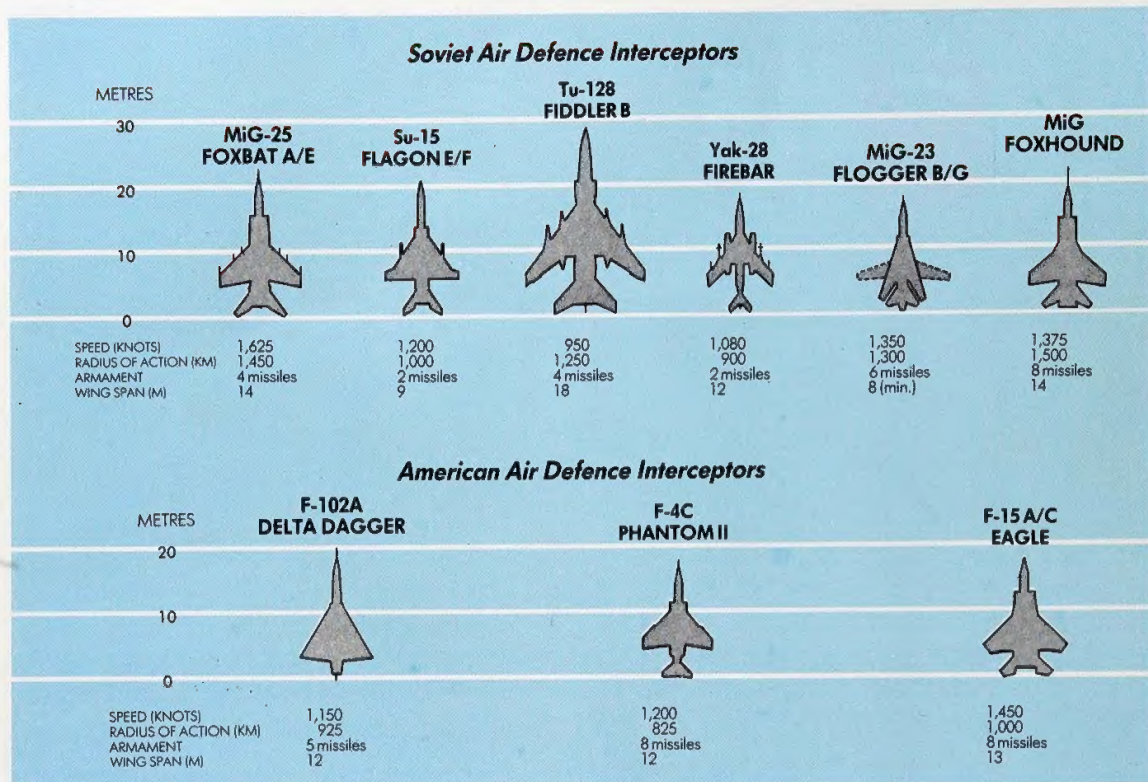
## FIGHTERS

Fighters of every type have reached the highest stages of development in front-line aircraft. The Soviets are working hard to improve the radars and their all-weather intercept capability of their present fleet of attack aircraft. These are two fields in which, up to the present, the Warsaw Pact countries have been largely outclassed by the West.

Two large design bureaux are responsible for most of

the front line aircraft in the Warsaw Pact: Mikoyan-Gurevich and Sukhoi. Each of these makers has developed a very wide range of aircraft capable of every possible type of mission in the European theatre – from ground attack to interception. The most recent machines to be brought into service since 1978 are the Su-24 *Fencer* in the A and C versions.





This machine is probably capable of offensive action deep within NATO's European territory. Its range is said to be 1,800 km. On the subject of new aircraft, reference must be made to the current flight testing of the two types of fighter, the MiG-29 *Fulcrum* and the Su-27 *Flanker*. These twin-engined aircraft represent an effort by Moscow to fill the technological gap with the west. The aircraft will have a greater thrust-weight ratio and manoeuvrability compared with early models.

The introduction of new machines does not mean that earlier models are superceded. All the planes listed below remain fully operational.

### Mikoyan-Gurevich MiG-17

This single seater, all weather fighter-interceptor is still extensively used by the air forces of the Warsaw Pact countries in its "F" version, despite the fact that it entered service in 1952. At that time it received the NATO code-name *Fresco*. The MiG-17 has a wingspan of 9.5 m, a length of about 11 m, and a height of 3.3 m. Its maximum speed is 1,150 km/h, and its ceiling is 17,000 m with a range of about 1,500 km. Its armament is made up of three 23 mm cannons, 8 55 mm rockets or air-ground missiles. It can also carry 500 kgs of bombs.

### Mikoyan-Gurevich MiG-21

This single seater, multi-role fighter, with limited all-weather capacity, came into service in 1958. The version most used by the forces of the East is the Mig-21 *Fishbed L*. Its length is 14.5 m, its wingspan of 7.2 m and its height 4.5 m. Its performance is much better than that of the Mig-

17. Its speed can reach Mach 2.1, and ceiling is 18,000 m. Its range varies according to the amount of fuel carried in extra tanks from 1,100 km to 1,800 km. Its armament consists of two 30 mm cannon and two AA-2 Atoll air-to-air missiles.

### Mikoyan-Gurevich MiG-23

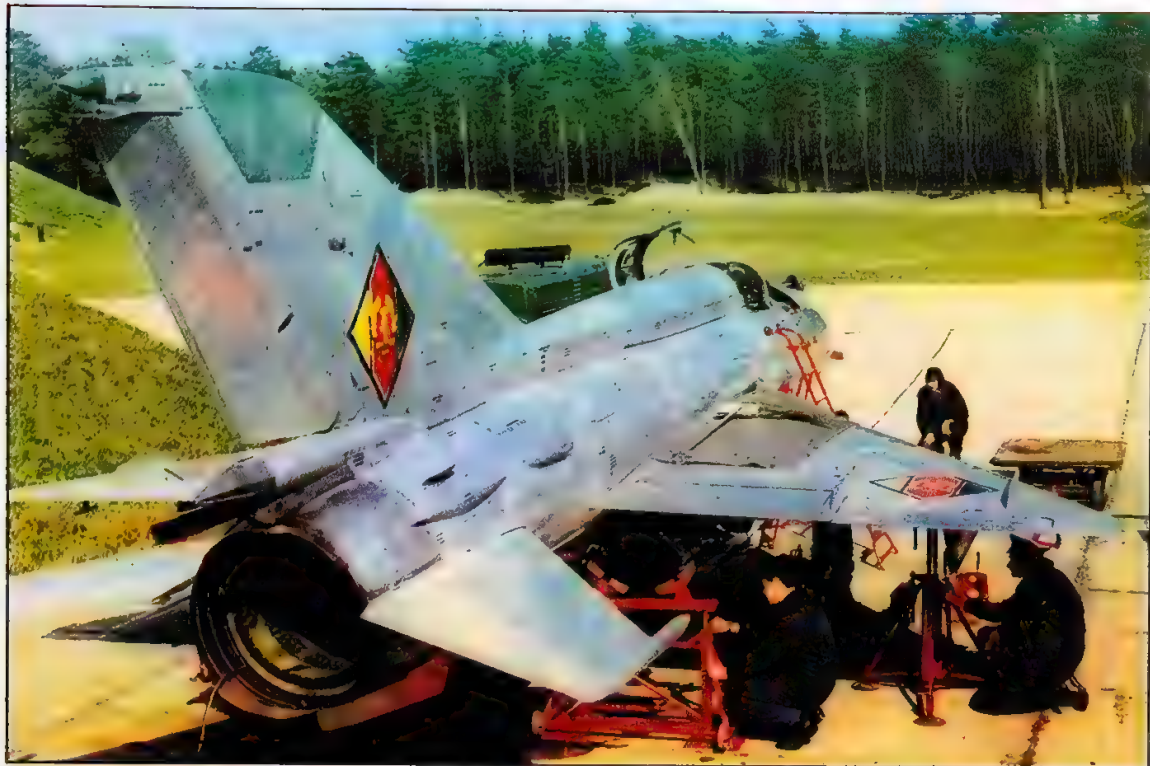
Since its appearance in 1971, this machine has been given the NATO code-name *Flogger*. The MiG-23 is a single-seater, all-weather interceptor with variable geometry. Its length is a little more than 16 m, and its height is 4 m, its maximum speed is Mach 2.2 with a ceiling of about 17,000 m, and its radius of action is 640 km. It is fitted with a double-barrelled 23 mm canon and different types of air-air missile, especially the AA-7 *Apex* with radar or infra-red guidance. A version known as the MiG-23U is used as a two-seater trainer. The MiG-23 is today widely used by all the airforces of the Warsaw Pact.

### Mikoyan-Gurevich MiG-25

The MiG-25 is an all-weather interceptor with a wide range of action. The first deliveries took place in the early 1970s. This fighter has a wingspan of 14 m, a length of 22.3 m and a height of 5.6 m. Its performance well exceeds that of its predecessors — it can reach a speed of Mach 3.2, and its ceiling is about 22,000 m. Its radius of action at high altitudes is 1,130 km. This performance made it the most high-performance fighter in the world for a few years.

The MiG-25 *Foxbat* has no cannon; its chief armament is 4 AA-6 air-air missiles. Two of these are guided by radar





Above A MiG-21 of the German Democratic Republic Air Force

and the other two by infra-red.

Speed is the main feature of this machine — of which a reconnaissance version has been designed.

### Sukhoi Su-15







Production of this machine, known by the NATO code-name *Flagon* started in 1967 and, together with the MiG-23, now replaces the old Su-9 and the Su-11. The Su-15 is an all-weather interceptor with a wingspan which varies (depending on the version) from 9.5 m to 11 m. Its length is 21.5 m and its height 5 m. Its maximum speed is 2,450

km/h (Mach 2.3), and its ceiling is around 20,000 m. It has a range of 2,250 km. Its main armament consists of two AA-3 *Anab* air-air missiles, which are either radio or infra-red guided.

### Sukhoi Su-7

This single-seater plane is a close support fighter and came into service in the early 1960s. Some versions of this machine are still in service today with Warsaw Pact forces. Its wingspan is 9 m, its length 17.4 m and its height 4.7 m.

### Soviet tactical aircraft

METRES	Su-24 FENCER A	MiG-23 FLOGGER B/G	MiG-27 FLOGGER D/J	Su-17 FITTER D/H	MiG-25 FOXBAT B/D	MiG-21 FISHBED L	Su-25 FROGFOOT
22							
11							
0							
SPEED (KNOTS)	1,250	1,350	980	1,200	1,625	1,205	475
RADIUS OF ACTION (KM)	1,800	1,300	1,200	700	900	900	556
ARMAMENT	Bombs 2,500 kg	6 missiles	Bombs 3,000 kg	Bombs 3,000 kg	—	4 missiles	Bombs 4,000 kg
WING SPAN (M)	10 (min.)	8 (min.)	8 (min.)	10 (min.)	13	7	15





*Top and left A Russian Yak-36 Forger landing on the deck of the aircraft carrier Kiev. Above and below A Soviet An-12 Cub transport.*





Its maximum speed is Mach 1.6 and its ceiling is 15,000 m. Thanks to two easily-jettisoned reserve tanks its range can be raised to 1,450 km. Its armament consists of 2 30mm cannons, and a load of 750 kg can be carried on the 4 external handpoints. This machine, like numerous Soviet fighters, also has a two-seater trainer version.

## ATTACK AND CLOSE SUPPORT AIRCRAFT

It is in this class of combat aircraft, which is the most important, that the Soviet Union yields ground to NATO. Nevertheless, the Soviet machines are still formidable. As well as its armament, this type of machine often has electronic counter-measure (ECM) systems for confusing the enemy.

### Mikoyan-Gurevich MiG-27

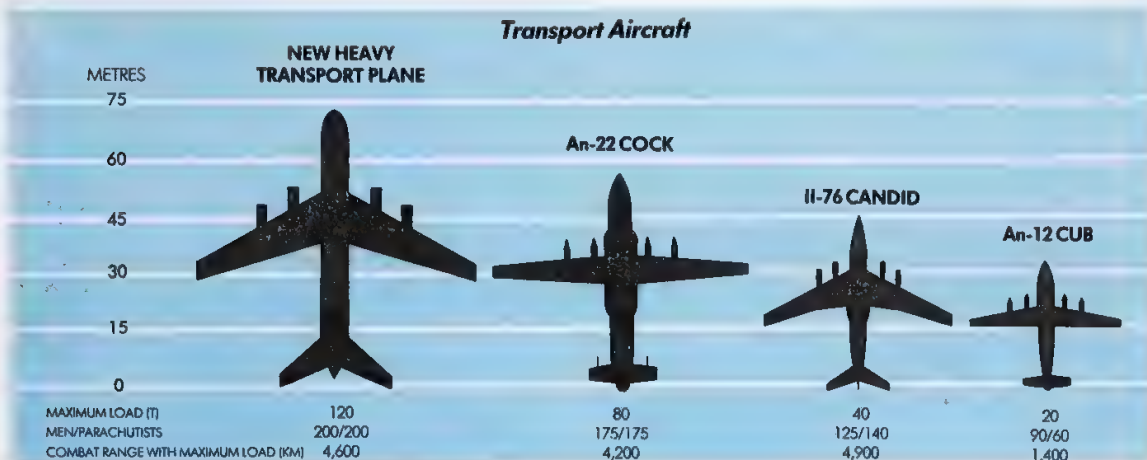
The MiG-27 *Flogger G* is a single-seater, ground attack plane, and has only recently been deployed within the

20 and the Su-22 export versions were produced. They differed from one another in performance.

### Sukhoi Su-24

This machine was given the NATO codename *Fencer* from the moment of its first flight in 1970. This two-seater, which was designed for a multiple role, has variable geometry. Its length is 21.3 m, and its wingspan varies from 9.5 m to 17.5 m. Its height is 6.4 m. Its unladen weight is 16,000 kg, but it is twice that weight, 32,000 kg, when fully laden without losing anything of its remarkable performance.

Its maximum speed is Mach 2.5; its ceiling 18,000 m and its range of action 800 km. Its armament consists of one 23 mm cannon and its six hard-points can take bombs, rockets and air-to-air or air-to-ground missiles. This formidable aeroplane is broadly similar to the American F-111. Its electronic equipment is very sophisticated.



Soviet forces. It was first produced during 1974. This machine has variable geometry, a length of 16.5 m and a height of 4.5 m. Its unladen weight is 7,850 kg, but when fully loaded it weighs 17,750 kg. Thus the MiG-27 will carry more than its weight of fuel and weaponry. Its maximum speed is around Mach 1.6 (1,700 km/h).

Its ceiling is almost 15,000 m, and its combat range is 950 km. Its main armament consists of a six-barrel 23 mm cannon and six external hand-points for every type of bomb or missile, notably the AS-7 *Kerry* guided missile. The MiG-27 also has electronic counter measure systems fitted into the fuselage.

### Sukhoi Su-17

The Su-17, which is a single-seater attack and close support plane, was first introduced in the beginning of the 1970s. It has a variable geometry and the wingspan varies between 10.6 and 14 m. Its length is nearly 19 m and its height 5 m. Its maximum speed is Mach 2.2 which is reached at the most favourable height of 18,000 m. Its range of action is 630 km.

The armament of the Su-17 is impressive. It carries two 30 mm cannons and has 8 hand-points beneath the fuselage and the fixed parts of the wings; hence it can carry 5 tonnes of weapons which can include the AS-7 *Kerry* missile. Some years after the appearance of the Su-17, the Su-

### Yakovlev Yak-36

The Yak-36 has been in service since the second half of the 1970s. The *Forger A* is a single-seater naval attack plane whose vertical take-off engine and horizontal propulsion make it possible for it to land accurately on the deck of the Kiev class aircraft carrier. Its wingspan is said to be about 7.5 m, its length approximately 17 m and its height 4 m. Its maximum speed is 1,380 km/h or Mach 1.3. Its ceiling is around 15,000 m and its radius of action is comparatively low, only 320 km.

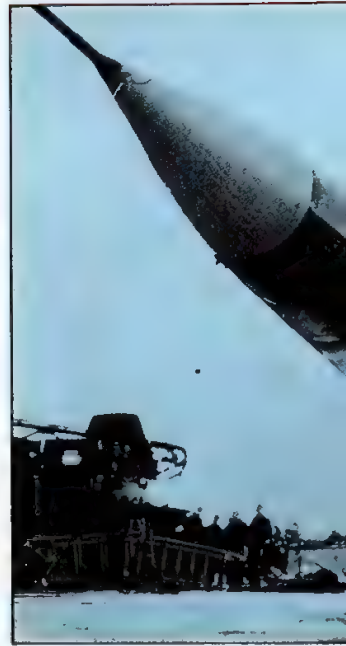
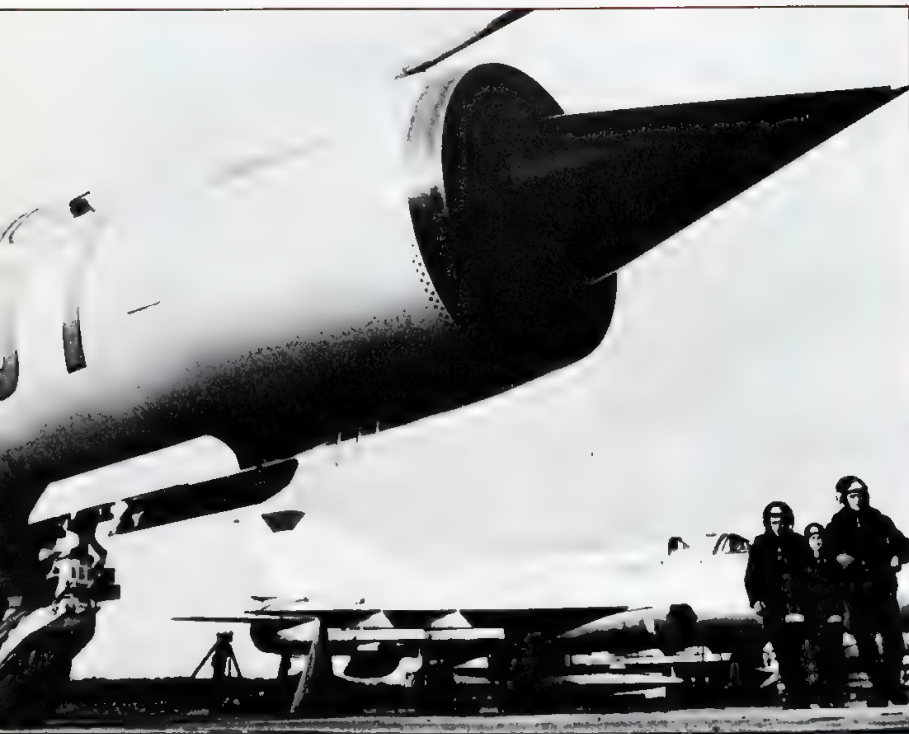
Its armament is carried on four external hand-points which are designed to take either bombs or missiles, in particular the AA-2 *Atoll* and the AS-7 *Kerry*.

## RECONNAISSANCE AIRCRAFT

As we already noted, some fighters can serve as very efficient reconnaissance aircraft. A version of the Mig-25 posed serious problems to the Israeli *Phantom* jets in this respect during the Middle East wars, mainly because of the altitude at which they were flying and their speed. All these reconnaissance sorties are of very great importance to Chiefs of Staff, and the technical sophistication of their equipment (cameras, photographic apparatus, etc) is remarkable.

The main task of reconnaissance planes is to detect, to measure and to analyse every signal and every radio





*Above* Soviet pilots approach their MiG-21.  
*Inset* An An-22 Cock transport. *Above right* MiG-23U Flogger C.  
*Below* A MiG-23 Flogger, ready for take off.  
*Bottom right* A rare view of the elusive Tu-22 Backfire bomber.







transmission put out from enemy territory. The Soviets have an impressive range of aircraft of this type. But in fact, most of this fleet is made up of special versions of long- and medium-range bombers described above, the Myasichtchev M-4 *Bison*, the Tupolev Tu-16 *Badger*, the Tupolev Tu-20 *Bear* and the Tupolev Tu-22 *Blinder*. One single machine seems, however, to be designed solely for these sorties: the Yakovlev Yak-26.

### Yakovlev Yak-26

This machine came into operation in 1957. It has a wingspan of 22 m, a length of 19 m and a height of 4.4 m. Its maximum speed is 1,100 km/h (Mach 0.96), its ceiling is about 15,000 m and its range of action varies, according to the version, from 1,600 to 4,000 km. The most recent Yak-

26 *Brewer* has a silhouette which resembles that of its elder brother, but the equipment and the electronics seem to be completely different.

### ANTI-SUBMARINE WARFARE AIRCRAFT

A large proportion of Soviet naval aircraft are land-based. They undertake numerous ocean-going patrols, and are ready to engage in exercises with Soviet ships cruising some distance from the Russian mainland. It is medium-range bombers of the Tu-26 *Backfire*, the Tu-16 *Badger* and the Tu-22 *Blinder* types which are mainly involved.

Attack aircraft like the Su-17 *Fitter* type have also been observed on these duties. A maritime patrol sea plane, the Beriev M-12 *Tchaika*, which first appeared in 1962 and received the NATO codename *Mail*, has also been seen; this aircraft was, for a long time, the holder of many world records in this category. There is also the Ilyushin Il-38 which, as well as being a submarine killer, also undertakes patrols. This machine, which carries bombs, mines and various other weapons, can stay in the air for 15 hours at a maximum speed of about 700 km/h.

### Transport and refuelling machines

In this category, the USSR has three main types of machine: the Antonov An-22, the Antonov An-12 and the Ilyushin Il-76.

### Antonov An-22

This heavy logistic transport has been given the codename of *Cock*. It is one of the largest aircraft in the world. Its unladen weight is 114,000 kg, but loaded it can reach 250,000 kg. Its wingspan is 64.4 m, its length is 58 m and its height is 12.5 m. Its cruising speed is of the order of 650 km/h. Its range varies with load from 5,000 to 10,000 km. The first deliveries were made in 1974.

### DETECTION AND ELECTRONIC AIRCRAFT

The only Soviet machine in this category is the Tupolev Tu-126 *Moss*, which dates from 1967. This AWACS of the Warsaw Pact has a wingspan of 51 m, a length of 55.5 m and a height of 16 m. Its maximum speed is of the order of 800 km/h. Its operational height is around 12,000 m and it can stay aloft for 18 hours.







# THE AERIAL STRENGTH OF NATO





If a third world war were to break out, the NATO powers would be at a numerical disadvantage as regards aircraft in the European theatre. However, the balance is partly made good thanks to the technological and electronic advances made by the air forces in the West. This superiority is also true as regards training of crews and combat experience. To consider just one comparative statistic, each month a NATO pilot undergoes an average of 20 hours flying training.

Their counterparts in the East are, for their part, only airborne for 5 hours a month. Observers believe that this difference would, in the event of a general war on European soil, be translated into greater efficiency on the part of the Atlantic Alliance.

### American air power

It is again the United States which, within the NATO framework, has the largest number of aircraft. In the view of the Soviet Union, the Americans will try to obtain air superiority as quickly as possible in the event of war breaking out. Experience in Vietnam has confirmed this policy. In order to impose this mastery of the skies, the United States must take into account the anti-aircraft defences of the Warsaw Pact countries.

The Americans believe in the massive destruction of these installations which have been erected at great expense by the Soviet Union. Great Britain and West Germany, as part of NATO forces, are not much in favour of this idea which they regard as suicidal. They would prefer

to mount deep penetration sorties at low altitude, in order to avoid being spotted by the anti-aircraft defences.

While the Warsaw Pact countries are provided mainly with Soviet equipment, the Atlantic Alliance countries are usually provided with their own equipment, an approach favoured by Great Britain, West Germany, Italy and France (who, it will be remembered, is no longer a member of the NATO military organisation). Below are described the principal types of aircraft in each country which could be brought into action in the event of war.

### STRATEGIC BOMBERS

The American fleet of strategic bombers is composed essentially of B-52s. These powerful, imposing machines have already proved themselves, notably in the Vietnam theatre of battle. However, a new, more powerful plane is about to emerge from the Rockwell International research laboratories. This is the B-1. Only four prototypes of this bomber are operational today. The construction of a second version, the B1-B, is currently under way, and should be in service in 1986.

In France, the *Mirage* 2000N will take over the duties of the *Mirage* IV and of the nuclear-capable *Jaguars*. Sophisticated weapons systems and a theoretically greater range of action, through in-flight refuelling, will make the *Mirage* 2000N a formidable aircraft with a far greater capability than its predecessors.

### FIGHTERS

Although outnumbered on a global level, the Atlantic Alliance has a greater number of types of machine in this category than the Warsaw Pact countries. This is an advantage in the sense of there being a greater number of types of fighter in relation to the missions assigned to them. But it is an inconvenience when one considers the problems of standardisation.

#### General Dynamics F-16 (USA)

This single-seater fighter bomber came into service during 1978, and replaced the F-104 *Starfighter* in a number of NATO air forces (Belgium, Denmark, Holland among them). It has a wingspan of 9.45 m, a length of 14.32 m and a height of 5 m. It has one engine, and can reach a maximum speed of Mach 1.95 (2,090 km/h). Its ceiling is about 18,000 m. Its armament consists of one multiple 20 mm cannon, and, according to the version, 7 or 9 hand-points capable of carrying loads varying between 5 and 7 tonnes. The design of the F-16 is tailored for air defence sorties in fine weather. Its all-weather and strike capabilities will, in view of its combat range (at present between 200 and 500 km) be developed in later versions. This machine is also built under licence in Europe.

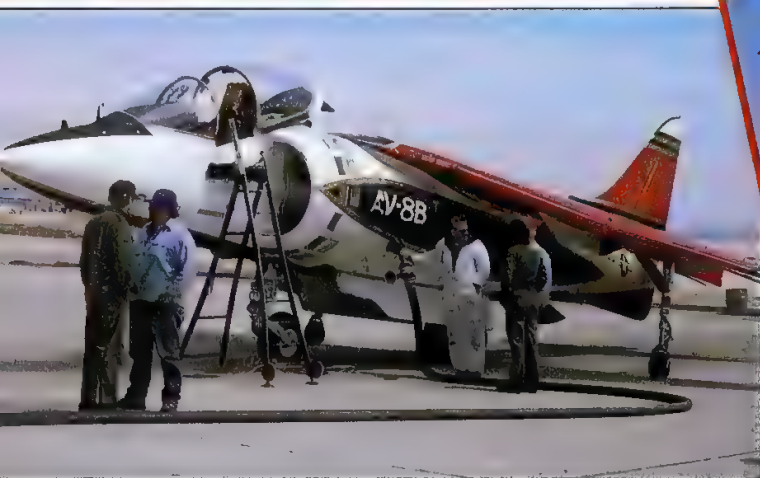
#### Grumman F-14 Tomcat (USA)

The F-14 is a two-seater multi-purpose carrier-based fighter. Its geometry is variable. It entered US Navy service in 1972. It has a maximum speed of Mach 2.3 at high altitudes, but at sea level it only reaches Mach 1.2. Its ceiling is about 17,000 m. Its endurance will easily allow it to travel about 3,000 km without refuelling. Its armament is composed of a multi-barrel 20 mm cannon and 8 or 12 air-air *Sparrow* or *Sidewinder* missiles.

Top left A flight of F-4 Phantoms in formation. Inset A Tornado flying beside a Buccaneer. Below A base used by Hercules C-130 tactical transports.







*Top* A US F/A-18 Hornet. *Above* The Mirage F1 single-seat, multi-purpose all-weather fighter. *Left* Prototype of an American AV-8B during trials at Edwards base. *Right* The F-5E Tiger II. *Below* The Nimrod, a British aircraft used in anti-submarine warfare. *Inset* An American simulation of an F-18 approaching an aircraft carrier.

### McDonnell Douglas F-4 Phantom II (USA)

The F-4 was originally designed as an all-weather, sea-borne interceptor. As time went on it became a multi-role fighter for use either from a carrier or based on land. Made also in Japan under licence from America, this machine has a wingspan of 11.7 m, a length of 17.8 m and a height of about 5 m. At high altitudes, its speed can approach Mach 2.3. Its ceiling is around 20,000 m. With extra tanks it can travel about 4,000 km. Its armament consists of 20 mm multi-barrel cannon and 9 hand-points for carrying air-air Sparrow and Sidewinder missiles.

Production of this machine was stopped in 1978, its aerodynamic properties and its manoeuvrability at low altitudes when fully loaded now outclassed. In spite of its defects, the F-4 Phantom remains a formidable aircraft capable of rivalling its Warsaw Pact counterparts.

### McDonnell Douglas F-15 Eagle (USA)

Ever since its commissioning in 1974, the F-15 Eagle has proved to be the most versatile fighter in the world. This



single seater, all-weather machine, with no equal, has a wingspan of 13 m, a length of 19.5 m, and a height of 5.7 m. Its performance is astonishing, and its maximum speed is greater than Mach 2.3, or more than 2,600 km/h.

The F-15 *Eagle* is equipped with a 20 mm cannon with 960 rounds and 8 hard-points for *Sparrow* and *Sidewinder* air to air missiles. It can also take a dozen 450 kg bombs. Its range when loaded, with maximum fuel, is 6,000 km, and its ceiling is greater than 21,000 m. It is still the best fighter in the world today.

### McDonnell Douglas/Northrop F-18 Hornet (USA)

The F-18 *Hornet* is a single seater, multi-purpose fighter operating from aircraft carriers. Its commissioning dates from the start of the 1980s. Its wingspan is 11.4 m, its length 17 m and its height 4.5 m. It can reach a speed of Mach 2 at high altitudes, and its ceiling is put at 18,000 m. Its range of action in combat is 750 km. Its armament consists of one 20 mm cannon and nine hard-points for various missiles: bombs, ECM, *Sparrow* and *Sidewinder*. When accelerating it is capable of outdistancing the F-4, F-14 and F-15. It is therefore one of the major trump cards in the United States Navy.



### Northrop F-5 (USA)

The F-5 is a single seater reconnaissance fighter. The first version made its first flight in 1959. The characteristics of the F-5 vary with the model. For the most recent types (the E and F), the dimensions are as follows: wingspan 8.1 m, length 15.8 m and height 4.1 m. The performance of the E type is the more remarkable with its maximum high altitude speed of Mach 1.6, a ceiling of 15,500 m, and a range of around 3,200 km. As regards weapons, this fighter is fitted with 2 20 mm cannons with 280 rounds each and five hand-points for outside loads. There is a *Sidewinder* missile at each wingtip. Those in the USAF only serve in 'aggressor' dissimilar combat training squadrons.

### Vought F-8 Crusader (USA)

One of the veteran American carrier-borne aircraft, this single-seater fighter entered service in 1957, and during the intervening years it has been given all the technical improvements required to keep it perfectly operational: all-weather radar, automatic pilot, etc. It has a wingspan of 11.1 m, a length of 16.6 m, and a height of 4.8 m. The maximum speed of the most versatile version is Mach 1.7. Its ceiling is 13,000 m approximately and its range is 750 km. Its armament consists of 4 20 mm cannons and 2 *Sidewinder* missiles together with bombs or rockets. Only the RF89 reconnaissance version still serves with the US Navy.

### Dassault-Breguet Mirage F-1 (France)

Deliveries of the *Mirage F-1C* have been going on since 1973. The prototype made its first flight in 1966. This single-seater, multi-purpose fighter is now deployed by NATO in Greece, Spain and France. The *Mirage F-1* has a wingspan of 8.4 m, a length of 15 m, and a height of 4.5 m. Its ceiling is 20,000 m, where it reaches a speed of Mach 2.2, and its range is around 3,500 km.

Its armament consists of 2 30 mm cannons, 5 hard-points for carrying different weapon systems and 2 launching rails on the wing tips. This machine can carry a total weapons load of 4,000 kg, but is outclassed by the most recent US fighters. However, when armed with Super Matra 530 long range combat missiles, it is still a formidable adversary.

### Dassault-Breguet Mirage III (France)

The first flight by a *Mirage III* took place in 1956. In 1965 Israel suggested to the French makers that they might design a new version of their interceptor, and the *Mirage V* was born. The *Mirage III* has a wingspan of 8.2 m, a length of 15.4 m and a height of 4.2 m. One of the models, the *Mirage IIW* competes economically and directly with the F-5 from America for sales to NATO forces. This machine is able to reach a maximum speed, at its 17,000 m ceiling, of Mach 2.2. When provided with reserve tanks, the *Mirage III* has a range of 4,000 km. Its armament consists of 2 30 mm cannons and three hand-points for bombs or missiles.

### Dassault-Breguet Mirage 2000 (France)

This high quality interceptor and fighter was first commissioned at the end of the 1970s and is the best performer in the French Air Force. It can easily outclass the fighters now in use by the Warsaw Pact countries. Its wingspan is 9 m, and its length is 15 m. Its maximum speed is Mach 2.3,



its ceiling about 20,000 m, and its combat range, when provided with reserve tanks, is some 1,800 km. The *Mirage 2000* is fitted with two 30 mm cannon and with Matra Super 530 or R550 Magic missiles. It can also carry 20 250 kg bombs. It is also fitted with a radar with a range in the order of 100 km.

## ATTACK AND CLOSE SUPPORT AIRCRAFT

This category of combat aircraft is widely represented inside the forces of NATO. The United States, Great Britain and France have all begun production of numerous models – of which the most recent are very efficient.

### Fairchild Republic A-10A (USA)

The A-10A is a plane which is very easy to recognise thanks to its characteristic silhouette: turbo fans behind the wings in the shape of a sail. Its wingspan is 17.5 m, its length 16.3 m, and its height 4.5 m. Its maximum speed is rather slow – only 610 km/h when loaded. Its combat range of action is about 450 km. Its armament is impressive, having a multi-barrel 30 mm cannon and not less than 11 external hard-points for carrying a total load of 8,000 kg, of either bombs or missiles. It first entered service in 1974, and the fact that it can manoeuvre easily at low altitudes makes it a formidable tank hunter and killer.

### General Dynamics F-111 (USA)

The F-111 was brought into service in 1967, and the latest version only became operational in 1981. This two-seater, all-weather attack bomber, with variable geometry, measures 22.5 m in length and 5.22 m in height and has an impressive performance. Its wingspan, with its wings open is 21.3 m. Its maximum speed is Mach 2.2, its ceiling around 18,000 m, and its range is 5,000 km. Main armaments consist of eight hard-points capable of carrying varying weapons systems of a total weight of more than 14 tonnes. The F-111 can be used for electronic warfare or tactical nuclear weapons delivery.

### BAe Buccaneer (Great Britain)

This attack aircraft made its first flights in 1958, and deliveries continued up to 1975. Over this period seven versions of the *Buccaneer* were produced. This strike aircraft which used to operate from aircraft carriers, has a wingspan of 13.4 m, a length of 19.3 m, and a height of 4.9 m. Its maximum speed at sea level is 1,000 km/h (Mach 0.8) its ceiling is greater than 9,000 m and its range is 3,700 km. The weapons carried by this aircraft can exceed 7,000 kg on each mission, and consist mainly of 4 454 kg bombs and an impressive range of missiles. RAF *Buccaneer* have been retro fitted with sophisticated electronic counter-measures equipment.

### Vought A-7 Corsair II (USA)

This single-seater attack bomber made its first flight in 1965. This plane, derived from the *Crusader*, has a wingspan of 11.8 m, a length of 14 m, and a height of 4.9 m. Its maximum speed at low altitudes is about 1,100 km/h. When provided with extra fuel tanks, its range can be more than 6,000 km. Its armament consists principally of 2 20 mm cannons and 8 hand-points under the wings and the fuselage. According to the version in question, the *Corsair II* can carry between 7 and 9 tonnes of armament.



Above A US C-130 refuelling a squadron of F-16 in flight. Inset A US F-16 fighter. Below F-5E and F-15 Eagle in formation. Top right US A-7 Corsairs ready for take-off. Centre Tornado air-defence variant prototype. Below right US B-1B strategic bomber.

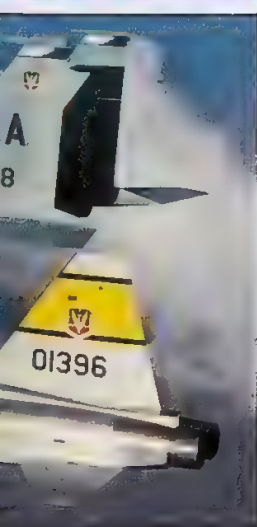


### McDonnell-Douglas AV-8B (USA)

This V/STOL attack fighter made its first flight in 1978. Its entry into service is urgently awaited by the US Marine Corps. With a wingspan of 9.2 m, a length of 13.1 m and a height of 3.4 m, this machine is equipped with a weapons system consisting of 2 20 mm cannons and seven hard-points which will take missiles or extra tanks to a total weight of about 3,500 kg.

### Lockheed F-104 Starfighter (USA)

A number of versions of this plane have been produced, and each has served a different purpose: single-seater interceptor for daylight use, all-weather interceptor or multi-purpose attack fighter. Its length is 16.7 m, its wingspan 6.7 m and its height is 3.4 m. Its maximum speed





is Mach 2.2 (2,300 km/h) and its ceiling is approximately 18,000 m. Its range is 2,200 km when fitted with extra fuel tanks.

With regards to its armaments, some versions have a multi-barrel 20 mm cannon and various hand points beneath the wings and fuselage. The G version has been specially designed for use in West Germany. A number of accidents spoil the career of this plane whose reliability does not seem to be completely certain.

### **BAe Harrier (Great Britain)**

The first tethered flight of the *Harrier* took place in 1960. This tactical attack and reconnaissance aircraft, which can be used on both aircraft carriers and dry land, has a length of 13.9 m, a wingspan of 7.7 m and a height of 3.3 m. Its maximum speed at low altitudes is about 1,200 km/h. Its ceiling is of the order of 15,000 m and its combat range without extra fuel tanks is 418 km. The armament of the *Harrier* is as large as it is varied. Its normal load is about 2,500 kg. It can carry a 30 mm cannon, Matra 155 missiles or rockets.

### **Panavia Tornado (European collaboration)**

This two-seater multi-purpose combat plane was designed jointly by the British, the West Germans and the Italians. Its first flight took place in 1974. It entered service at the start of the 1980s. This machine, of variable geometry, has a wingspan ranging from 8.6 to 13.9 m, a length of 16.7 m and a height of 5.7 m. Its maximum speed at its ceiling, which is in excess of 15,000 m, is Mach 2 (2,135 km/h) and its range, without extra fuel tanks, is 1,610 km. Its arma-

ment is considerable. It is mainly composed of two 27 mm cannons and 7 hard-points on its pivoting wings and under the fuselage which can carry 6,800 kg. An air defence variant of the *Tornado*, operational from the middle of the 1980s, has been specially ordered by the RAF to defend British air space and brought into service to replace the F-4 Phantoms.

### **Sepecat Jaguar (Franco-British)**

This all-weather attack single-seater is the result of Franco-British cooperation, and made its first flight in 1968. The first squadrons were formed in 1972. The *Jaguar* has a wingspan of 8.69 m, a length of 12.5 m and a height of 4.9 m. Its maximum speed when loaded is Mach 1.1 (1,320 km/h), and its range of action under normal conditions is 815 km. It is equipped with 2 30 mm cannons and five hard-points which can carry a load greater than 4,500 kg.

### **Dassault Etendard (France)**

This single-seater fighter for use on aircraft carriers, made its first flight in 1956. It has a length of 14.4 m, a wingspan of 9.6 m, and a height of 4.3 m. It has a maximum speed at low altitude of about 1,100 km/h, a ceiling of 15,000 m, and a range of 1,700 km. Its armament is composed mainly of two 30 mm cannons and four hard-points, situated under the wings, which can carry a maximum load of 1,360 kg.

### **Dassault-Breguet Super Etendard (France)**

The *Super Etendard* was designed to gradually replace the



*Etendard* on France's two aircraft carriers. It made its first flight in 1974, and deliveries were made from 1978 onwards. Its characteristics are similar to those of its elder brother: a wingspan of 9.6 m, a length of 14.3 m and a height of 3.8 m. However, its performance is better: its

Below A *Tornado* fitted with air-to-ground and air-to-air missiles.

Right A C-130 *Hercules* troop transport.

Inset (below) An American F-18 *Hornet*.



maximum speed at low altitudes is 1,200 km/h, its ceiling is close to 16,000 m, and its range at high altitudes is 2,000 km. Its armament is correspondingly greater: its load is shared by the 5 hard-points, and amounts to 4,500 kg. In addition the *Super Etendard* is equipped with 2 30 mm cannons.

### RECONNAISSANCE AIRCRAFT

After relying for many years on using modified aircraft for the purpose of reconnaissance, the USA developed and built an impressive fleet of sophisticated aircraft with the specific job of reconnaissance. The famous Lockheed U-2 spy plane made its first flight back in 1956 and was followed by the more advanced Grumman OV-1 *Mohawk* and then by the most spectacular sky spy-plane of all: the Lockheed SR-71, *Blackbird*.

While the US has developed – and exploited to the full – their reconnaissance aircraft, the Soviets have continued to use large numbers of converted medium and long-range bombers.







### ANTI-SUBMARINE AIRCRAFT

Every country with a naval air arm has its own submarine chasers. The qualities looked for in this type of aeroplane are different from those demanded of fighters: their speed for example, is always less than 1,000 km/h. The United States produced successively the Grumman S-2, the Lockheed P-3 *Orion* and the Lockheed S-3 *Viking*.

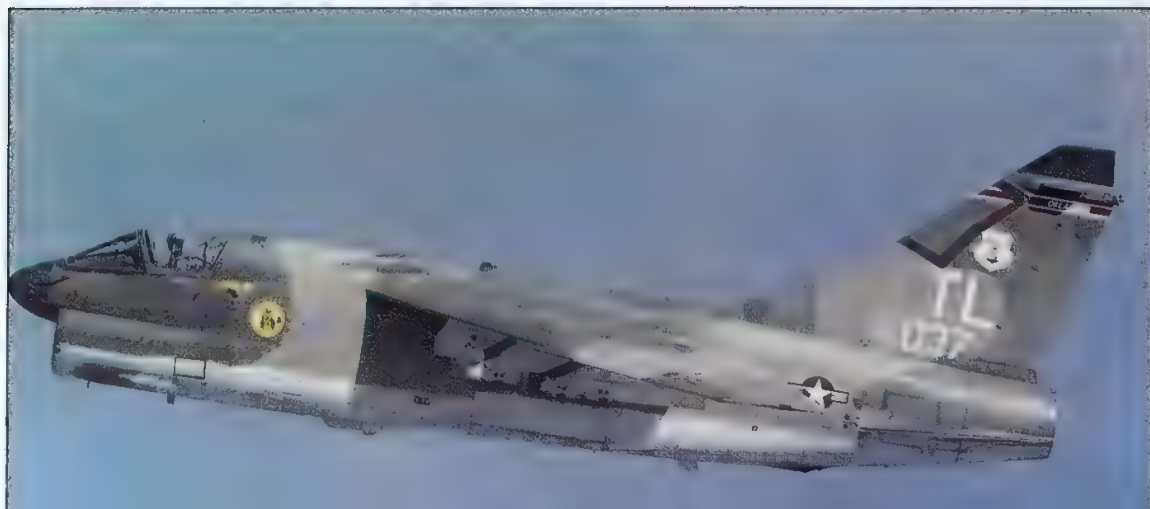
For its part, Great Britain developed the *Shackleton*, which first flew in 1949 and, more recently, the *Nimrod*, which first entered service in 1969. France supplied its aircraft carriers with *Alizé* and the land-based Breguet *Atlantique*. The main armament of these two types of aircraft are anti-submarine sonar, torpedoes and depth charges.

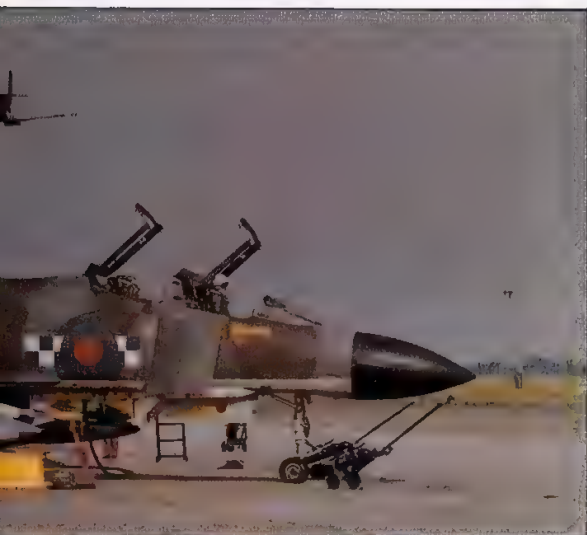
### TRANSPORT AND REFUELLING

In the event of a general war breaking out, these aircraft will play a crucial role. The efficiency of most fighters and bombers will depend on the quality of in-flight refuelling. In the same way, rapid transportation of men and matériel to the war zone will directly influence the outcome of the battle. In this connection, the USA has a powerful fleet of aircraft including the Boeing C-135 and KC-10.

But the most efficient aircraft is undoubtedly the Lockheed C-5A *Galaxy*, – one of the largest aircraft in the world.

Above British Sea Harrier, on deck waiting for take-off. Right Two Jaguar of 20 Squadron, RAF Germany. Below An F-4E Phantom at base. Bottom left An American A-7D Corsair. Bottom right An F-14 Tomcat.





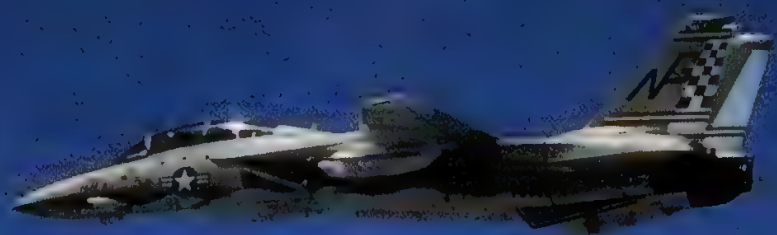
Its characteristics are imposing: wingspan 67.9 m, length 74.5 m, height 19.9 m. Its unladen weight is 147,528 kg, but when loaded it weighs 348,810 kg. This does not prevent it from having a maximum speed of 900 km/h at its ceiling of about 10,000 m. Its range is 12,900 km. As far as production by the European countries of NATO is concerned, mention can be made of the G/222, an Italian-made tactical transport; the *Victor*, a British-made tanker (versions K-1A and 2) and the French *Transall*.

### EARLY WARNING AIRCRAFT

The best-known US representative in this category is the Boeing E-3A *Sentry*, better known as the AWACS. This machine came into service with the US Air Force in 1977. It is 46.6 m long, 12.9 m high and has a wingspan of 4.4 m. The special features of the AWACS is the radome which is 9.14 m in diameter and contains a surveillance radar. Other US machines of this type, include the Grumman E-2 *Hawkeye*, a much smaller aircraft, but capable of operating from aircraft carriers.







**MISSILES  
LAUNCHED  
FROM THE SKY**

# The terror from the sky

*Missiles launched from the sky have enhanced the offensive capability of aircraft. The AGM (air-to-ground missiles) and the AAM (air-to-air missiles) have slowly replaced the traditional free-falling bombs and the old machine guns made famous in the aerial battles of the Second World War. Self-propelled and guided, these very sophisticated weapons derive much from the technical sophistication of today's aircraft. Their performance has completely changed the tactical basis of sorties by fighters and bombers.*

## AIR-TO-SURFACE MISSILES

### The Warsaw Pact

Ballistic missiles (ALBM) and cruise missiles (ALCM), when launched from aircraft and fitted with a nuclear warhead, form part of the front-line deterrence of the West. We will not concern ourselves with examining these strategic air-to-ground missiles here. In this connection, the Warsaw Pact is equipped only with Soviet weaponry. Very little is known in NATO about this category of missiles. Here the Soviets have succeeded in maintaining a veil of secrecy of the different types which equip their formidable air force. However, it is possible to put forward a few theories.

The AS-7 is fitted with a conventional warhead and has

a maximum range of 10 km. Its weight on launching is 1,200 kg, and it is designed to arm the Sukhoi Su-24 *Fencer*, an attack and close support machine. It has a speed of less than Mach 1.

The AS-8 has not been given a code name. Its range is put at about 10 km and its speed is equal to or below Mach 1. It should be remembered that it is this AS-8 which is fitted to helicopters of the Mil Mi-24 *Hind-D* type. The range of the AS-X-9 is about 80 to 90 km; this missile is intended also to arm the Su-24 *Fencer* and will carry a conventional charge. The AS-X-10 also has a conventional charge, but only has a range of 10 km.

*Left A US F-14 firing one of its Phoenix air-to-air missiles. Below A Mig-21 whose standard weapons is the AA-2 Atoll air-to-air missile.*





# The Atlantic Alliance

A number of the missiles available to the West are the result of international cooperation. The *Martel* was produced jointly by France and Great Britain at the start of the 1960s. This is either a television-guided or a passive homing anti-radar missile which, in the AJ 168 version, has a length of 3.85 m, a wingspan of 1.2 m, and a diameter of 0.41 m. Its weight at the time of launching is slightly over 500 kg, and its range varies with the height of the carrier plane at the moment of firing (between 30 and 60 km). This missile can fly at supersonic speeds. The pilot of the carrier plane can follow the progress of his missile towards its objective on a screen, and a sophisticated camera is installed inside the nose of the missile.

The *Otomat* is a product of Franco-Italian collaboration, and is an anti-shipping missile. The AS-2L is a Franco-German development of the *Roland* ground-to-air missile. The British and Americans are looking at the JP-233, an air-to-ground sub-munitions dispensing system whose main job will be the destruction of enemy airfield runways.

As early as 1938 France began investigating a flying

The AM-10 *Lasso* is fitted to naval helicopters (*Puma*, *Lynx*, *Dauphin*). The length of the missile is 2.1 m, its diameter is 0.2 m and its wingspan is 0.62 m. Its weight on launching is 70 kg and its range is 11 km. Design work on the AM-10 has resulted in the improved AS-15. The *Durandal* missile has been designed more specifically for destroying aerodrome runways. Its length is 2.7 m, its diameter 0.23 m and its wingspan 0.43 m. *Durandal* is fitted with a 'concrete dibber' penetration charge.

The air-to-surface version of the anti-ship *Exocet* was first commissioned in 1973, and the first trial took place from a *Super-Frelon* naval helicopter. The first air-to-ground West German missile was the subject of a design study at the beginning of the 1960s. This was the *Kormoran*, a missile with a length of 4.4 m, a diameter of 0.34 m, and a wingspan of 1 m, a range of 37 km and weighing 600 kg at launch. Today this missile is carried by two aircraft, the F-104 G and the *Tornado*. After the *Kormoran*, further design studies were undertaken to produce a missile with a better performance, and the *Jumbo* was produced during the 1960s. It was designed to equip F-4F *Phantoms* and *Tornados* of the naval air arm. Its length is 5.25 m, its diameter 0.5 m, and its wingspan 1.15 m; its weight on launching exceeds a tonne and it has a range of



Above An RAF technician fixing a *Sparrow* missile beneath the fuselage of a *Phantom* in Germany.



Above Fixing two *Sidewinder* missiles under the wings of another *Phantom*.

bomb guided by radio, the Breguet 910, but it was in 1955 that a totally new design proved a success. The AS-11 is directly developed from the SS-11 anti-tank missile. Nearly 200,000 missiles of this type have already been made. Priority for the AS-11 goes to equipping helicopters. Its length is 1.2 m, its diameter 0.16 m and its wingspan 0.5 m. It is able to carry different charges (armour-piercing or fragmentation) all of which are conventional. The AS-12 is developed directly from the AS-11 and its warhead is 4 times heavier. Then there came the new generation of missiles, the AS-20 and the AS-30, with a length of 3.8 m, a diameter of 0.34 m, and a wingspan of 1 m. Its range exceeds 11 km and its accuracy is about 10 m.

about 40 km. The guidance system, as in so many cases, is by television. It did not go into production.

The Italian Navy started designing the *Marte* in 1967. This machine is the AGM version of the *Sea Killer*, a ship launched surface-to-surface missile. Its main purpose is to attack surface ships. The *Marte* can be carried by helicopters of the Agusta type. Firing takes place at sea level. The succeeding project, called *Airtos* was abandoned before being put into production.

Norway has contributed the *Penguin*, an adaptation of the surface-to-surface missile of the same name. This missile is fitted to the F-16 and F-104G of the Royal Norwegian Air Force.

Britain's latest air-launched operational anti-ship missile, the *Sea Skua*, of which the first trials in guided flight took place in 1978, now finds numerous applications. Its length is 2.85 m, its wingspan is 0.60 m, and its diameter is 0.20 m. Its weight on launching is 145 kg and its maximum range is about 15 km. The *Sea Eagle* anti-ship missile developed directly from the *Martel* which arose from Franco-British cooperation. This missile has a greater length, and a range of more than 100 km (as against 60 km for the *Martel*). It is fitted with a very efficient radar system, and will become the main weaponry of both the *Tornado* and the *Sea Harrier*.

The United States has perfected no less than 22 air-to-surface missiles; from the flying bomb of the BG range, born during World War 2 up to the *Harpoon*, the AGM version of the surface-to-surface missile launched from ships. Between these two came missiles like the *Bat*, *Glomb*, *Gorgon*, *Kingfisher* and *Crossbow*. The *Bullpup* was developed in 1954. It was subsequently modified and several versions were produced. Its length varies according to the model, from 3.2 to 4.2 m, its diameter from 0.3 to 0.5 m, and its wingspan from 0.9 to 1.2 m. Its range varies between 11 and 16 km. The *Shrike* was based on the AAM *Sparrow*, and was the first anti-radar missile made by the Americans. Its length is 3 m, its diameter 0.2 m and its wingspan 0.9 m. Its range varies from 30 to 40 km. Two other anti-radar missiles have been produced, the ARM *Standard* and the *Harm*. This latter, whose trials started in 1979, represents, thanks to a very sophisticated guidance system, the most advanced development of the ARM. The *Paveway* laser guidance system, on which design studies were begun in 1966, was designed to increase the accuracy

of air-to-ground tactical weapons. It is fitted to numerous aircraft including the A-10A *Thunderbolt*. It allows almost any type of bomb to be terminally guided by the use of add-on adaptors.

Another system of autoguided bombs came in with the *Hobos*. This missile is made up of three distinct parts: at the front is the guiding mechanism, in the centre the military charge (between 900 and 1,300 kg) and, at the rear, the control module. The smallest AGM to come into service was the *Maverick* which was 2.5 m long, has a diameter of 0.3 m, and a wingspan of 0.7 m. It weighs 210 kg and has a range of 22.5 km.

Finally, the *Harpoon*, the all-weather, anti-ship missile. Trials on the prototype were first carried out in 1972 at the US Naval Missile Centre, Point Mugu, California, and the first deliveries entered service in 1977.

The *Harpoon* is 3.84 m long, has a launch weight of some 530 kg, and a range of 110 km. The *Harpoon* is very versatile and can be air-launched, or with – the addition of added-rocket boosters – ship or submarine-launched. The main use of the *Harpoon* is against surfaced submarines, patrol craft and destroyers.

Their use with US forces is rapidly being expanded. There are plans to deploy *Harpoons* on S-3 carrier ASW aircraft, in addition to the P-3 and A-6. In addition two squadrons of B-52s are being equipped with *Harpoons* and RAF *Nimrods* are to retain the *Harpoons* which they carried during the Falklands War.

As with all missiles systems described above, design studies are being carried out to improve the guidance system of the *Harpoon*. Total production 1984-88 will be 1,524.

Below An F-106A belonging to an Air National Guard air defence squadron just after launching one of its missiles.





# AIR-TO-AIR MISSILES



Above A Soviet Mig-25 *Foxbat*. This machine is generally equipped with AA-6 *Acrid* missiles.

## The Warsaw Pact

Only Soviet air-to-air missiles (AAMs) are fitted to the different types of Warsaw Pact aircraft. The first operational AAM was the AA-1 *Alkali*. Its development began in 1950, and since then there have been 6 different versions. Its length is 1.9 m, its diameter 0.19 m and its wingspan 0.6 m. Its weight at launch is 90 kg and its range is 8 km. The AA-1 was fitted, first of all, to the Mig-17P then to the Mig-19PM. It is fitted with a radar auto-guidance system.

The AA-2 *Atoll* appeared for the first time in 1961, and resembles the American *Sidewinder*. It quickly became the standard weapon for the Mig 21. Like the AA-1, the AA-2 was made in several versions. Its length is about 2.9 m, its diameter 0.12 m and its wingspan 0.5 m. Its weight on launching is 70 kg and its maximum range is close to 6.5 km. The AA-3 *Anab* was, from 1961, the first long range-AAM (32 km and more). Its length is 4 m, its diameter is 0.3 m and its wingspan is 1.3 m. Its weight is about 300 kg. The carrier aircraft, the Yak-28P generally carry 2 missiles of a different version (IR and SARH). The AA-3 *Anab* is gradually being replaced by the AA-7 *Apex*.

The AA-4 *Awl* is not well known. It is, however, bigger than previous AAM's: length 5 m, diameter 0.3 m and a wingspan of 1.8 m. Its weight on launching must be near to 400 kg and its range is certainly of the order of 100 km.

The AA-5 *Ash* was developed to equip the all-weather interceptor, the Tu-28P. Its main characteristics are very close to those of the AA-4; but its range is very inferior, being only 20 km in the IR version. The Mig-25-*Foxbat* is also equipped with this missile. The AA-6 *Acrid* is the largest air-to-air missile in the world. It has a length of 6.3 m (SARH version), a diameter of 0.4 m and a wingspan of 2.25 m. Its weight at launch is 850 kg, its range is 100 km, and it forms the main armament of the Mig-25 *Foxbat*. The AA-6 can reach a speed of Mach 4.5.

The deployment of the AA-7 *Apex* was detected by NATO in 1976. According to the US Defense Intelligence Agency there are two versions: the AA-7a and the AA-7b. The AA-7a is thought to be radar-guided and the 7b, an infra-red homing version. Both carry a 40 kg warhead and arms the Mig-21, Mig-23 and perhaps the Mig-25 *Foxbat-E*. The AA-8 *Aphid* is a close-combat air-to-air missile that is designed to replace the AA-2 *Atoll*. If it is a replacement for the *Atoll*, it will be carried on a large number of Soviet aircraft in the future.



Above and left Two French Mirage 2000 prototypes armed with R.550 Magic air-to-air missiles.

## The Atlantic Alliance

The first AAM operational in the West was the French AA-20 which was commissioned in 1953. This missile, primitive by today's standards, was aimed visually, and manually controlled. A new generation, the AA-25 replaced this system with automatic radar and radio-guidance.

After the R.510 and the R.511, experiments were carried out with the R.530 and the Super 530. Development of this latter began in 1971 and today it has a speed of Mach 4.5. Its length is 3.54 m, its diameter is 0.26 m and its wingspan is 0.9 m. The first firing trials were made from a *Mirage F-1* in 1976. The most successful air-to-air missile in Europe has been developed by the firm Matra, and is known as the R.550 *Magic*. It has been ordered by several non-NATO countries, including Egypt, Ecuador and Syria. Its length is 2.77 m, its diameter 0.16 m and its wingspan 0.66 m; launch weight 90 kg; range is 10 km.

In 1969 West Germany started to develop an AAM designed to replace the American *Sidewinder*, to be called the *Viper*. While in 1972 the first tests were promising, the project was in the end abandoned in favour of a new American missile.

After developing the *Sispre C-7* during 1957, Italy began a design study for the *Aspide*, a missile to be interchangeable with the *Sparrow* surface-to-air missile. Thanks to its engine, this missile reaches a speed of Mach 4 at the end of its run. Length 3.7 m, diameter 0.2 m, wingspan 1 m. Launch weight is approximately 200 kg, its range 100 km. It is designed for the Italian *Tornado*.

Trials of the the British *Fireflash* and the *Firestreak* in 1949 and 1958 respectively, were successful. The *Red Dean/Red Hebe* project was abandoned in 1957, but at the end of the 1950s work was begun on the *Red Top*. This missile is now in service; it has a length of 3.3 m, a diameter of 0.22 m, and a wingspan of 0.9 m. Its weight at launch is about 150 kg, and its range 12 km. The SRAAM is a short-range missile whose development was begun in 1970. During trials this missile proved to possess extraordinary manoeuvrability, and could change direction by 90° after leaving its carrier plane. Its length is 2.7 m and its diameter 0.16 m.

Apart from air-to-ground missiles, the United States have carried out intensive research since 1945, in the

air-to-air missile field. The *Meteor*, *Oriole*, *Gorgon*, *Firebird* and other projects all succeeded each other, but the *Falcon* was the first guided AAM in the world to come into service. There have been numerous versions based on infra-red guiding and auto-guiding by semi-active radar. The last of the series was the AIM-4D which was designed for combat fighters. There has also been the short-range heat-seeking *Sidewinder* of which no less than 9 versions have been produced. It is the AIM-9B model which has been produced in the greatest quantities. Its length is 2.8 m, its wingspan is 0.5 m and, with a weight of 70 kg and has a range of 3 km. The AIM-7F *Sparrow* has a semi-active radar guidance system. Its length is 3.66 m, its wingspan is 1.02 m and its weight on launching is 200 kg. Its range is 40 km. The *Sparrow* will be replaced by the AMRAAM.

The project studies in connection with the AIM-82, the *Agile* and *Claw*, were abandoned; but the *Phoenix* project was turned to good account. This is the world's most sophisticated air-to-air missile, and is fitted only to the F-14 *Tomcat*. Its maximum speed Mach 3.8. The reliability of its guidance system make it possible for it to hit its target under the most difficult atmospheric conditions, and no matter at what angle the target. It is 4 m long, 0.4 m in diameter and its wingspan is 0.9 m. Its launching weight is 450 kg, and its 210 km range is formidable.

The last two projects mentioned are in the experimental stage, namely the ASRAAM (a close-combat missile) and the AMRAAM (an intermediate-range missile). Both missiles should be operational by the end of the 1980s.

The AMRAAM or Advanced Medium-Range Air-to-Air Missile, to give it its full name, is being developed and researched as a joint US/NATO programme. The aim is to make the system compatible with the F-14, F-15, F-16 and F-18 as well as the *Tornado* and other NATO aircraft. It will be an all-weather, all-aspect, radar-guided missile capable of engaging numerically superior enemy aircraft before they come into visual range. Length 3.65 m; diameter 1.78 m; wingspan 5.26 m. Simultaneous launches of up to 8 missiles at multiple targets can be made with AMRAAM.

ASRAAM (Advanced Short-Range Air-to-Air Missile) is also a joint US/NATO project. It is intended to replace the AIM-9 *Sidewinder* by the 1990s.



# THE BALANCE OF AIR POWER THE WARSAW PACT AGAINST NATO

*For the last ten years, the Soviet Union and the Warsaw Pact have been progressively renewing their air arms. The East has not yet acquired mastery of the European skies, but the progress made by the Soviets leaves one in no doubt that they can achieve this unless the West reacts vigorously between now and 1990.*





*Below left* Grumman E-2 Hawkeye AWACS aircraft. *Above* American RF-4C in its all-weather reconnaissance version. *Below* British Nimrod, naval reconnaissance aircraft used in anti-submarine warfare. *Bottom* A Soviet Il-76 Candid troop transport.





# THE WARSAW PACT COUNTRIES

## BULGARIA

**Manpower:** 33,800 men (18,000 conscripted). 248 fighter aircraft.

**Types of aircraft:** 6 squadrons of ground-attack fighters made up of 64 Mig-17. 8 interceptor squadrons the first made up of 20 Mig-23 *Flogger*, the remaining 5 of 80 Mig-21, 2 others with 60 Mig-17. 2 reconnaissance squadrons with 24 Mig-17. 1 transport regiment: 10 Il-14, 4 An-24, 2 Tu-134 and 9 An-2. 1 helicopter regiment: 10 Mi-2, 40 Mi-4/-8, 12 Mi-24 and 12 Ka-26.

**Units in training:** 80 L-29, 30 Mig-15 UTI and numerous Yak-11/-18.

**Paratroops:** 1 regiment

**Air-to-air missiles:** AA-1 *Alkali* and AA-2 *Atoll*.

**Anti-aircraft defence:** 30 missile sites made up of 280 missiles of 3 types: SA-2 *Guideline*, SA-3 *Goa* and SA-4 *Ganef*.

**Reserves:** 20,000 men.

## HUNGARY

**Manpower:** 21,000 men (8,000 conscripted). 140 fighter aircraft.

**Types of aircraft:** 6 interceptor squadrons equipped with 120 Mig-21 and 20 Mig-23, 1 transport regiment including 24 An-2/-24/-26, Il-14 and 2 Tu-134. 3 helicopter squadrons with 60 Mi-2/-8, 20 Mi-24 and 25 Ka-26.

**Training units:** L-29 and Mig-15 UTI.

**Air-to-air missiles:** AA-2 *Atoll*.

**Anti-aircraft defence:** 20 launching sites made up of about 150 SA-2 *Guideline*, and SA-2 *Goa*.

## POLAND

**Manpower:** 88,000 men (27,000 conscripted). 705 fighter aircraft.

**Types of aircraft:** 18 ground attack fighter squadrons of which 3 equipped with 35 Su-7, 3 with Su-20 and 12 with 150 Mig-17. 33 interceptor squadrons with 430 machines either Mig-17, Mig-21 and Mig-21U. 6 reconnaissance squadrons made up of 35 Mig-21, 5 Il-28 and 15 Lim-6. 2 transport regiments with 9 An-62, An-12, 12 An-26 and 12 Il-14. 1 Squadron of light liaison aircraft with 2 Tu-134A, 5 Yak-40, some Il-18 and 4 Mi-8 helicopters. 3 helicopter regiments with 250 Mi-1 and Mi-2, 12 Mi-4, 25 Mi-8 and 12 Mi-24.

**Training units:** 300 machines of the types TS-8, TS-11, Mig-15UTI, Mig-21UTI, Su-7U.

**Air-to-air missiles:** AA-1 *Alkali* and AA-2 *Atoll*.

**Anti-aircraft defence:** 50 launching sites with 425 SA-2 *Guideline* and SA-3 *Goa* missiles.

## EAST GERMANY

**Manpower:** 37,000 men (15,000 conscripted). 359 fighter aircraft.

**Types of aircraft:** 18 fighter squadrons equipped with 300 Mig-21F and Mig-23. 4 squadrons of ground attack fighters with 35 Mig-17 and 12 Mig-23. 1 reconnaissance squadron with 12 Mig-21. 1 transport regiment with 20 Il-24, 15 Tu-134, some An-2 and An-14. 6 helicopter squadrons equipped with 60 Mi-2 and Mi-4, 45 Mi-8, 30 Mi-24.

**Training units:** Some 50 aircraft of the Yak-11, L-39 Zlin 226 and Mig-15 UTI types.

**Paratroops:** 2 battalions.

**Air-to-air missiles:** AA-2 *Atoll*.

**Air-to-ground missiles:** AT-3 *Sagger*

**Anti-aircraft defence:** 30 launching sites with 200 SA-2 *Guideline* and SA-3 *Goa* missiles.

## RUMANIA

**Manpower:** 32,000 men (10,000 conscripted). 315 fighter aircraft.

**Types of aircraft:** 6 ground attack fighter squadrons equipped mainly with 70 Mig-17. 12 interceptor squadrons with 200 Mig-21 of different types and 24 Mig-23. 1 transport regiment with 3 Il-14, 4 Il-18, 1 Il-62, 10 An-24, 6 An-26, 5 Li-2 and 1 Boeing 707. 1 reconnaissance squadron with 18 Il-28. 1 helicopter regiment with 10 Mi-4, 25 Mi-8, 45 *Alouette* and 25 *Puma*.

**Training units:** 50 L-29 and 50 Mig-15 UTI.

**Air-to-air missiles:** AA-2 *Atoll*.

**Anti-aircraft defence:** 20 launching sites with 108 SA-2 *Guideline* missiles.

**Reserves:** 45,000 men.

## CZECHOSLOVAKIA

**Manpower:** 56,500 men (17,000 conscripted). 471 fighter aircraft.

**Types of aircraft:** 13 ground-attack fighters with 80 Su-7BM, 12 Mig-23, 42 Mig-21 (and Mig-21U). 18 interceptor squadrons with 252 Mig-21, Mig 21U and Mig-23. 3 reconnaissance squadrons with 25 Mig-21 RF and 30 L-39. 2 transport regiments equipped with 6 An-24, 40 Il-14, 1 Tu-134, some LET L-410 M and Tu-154 B. 1 helicopter regiment with 50 Mi-1, 20 Mi-2, 100 Mi-4, 30 Mi-8 and 12 Mi-24.

**Training units:** 24 L-39, and several Zlin 326.

**Air-to-air missiles:** AA-2 *Atoll*.

**Anti-aircraft defence:** 40 launching sites fitted with 250 SA-2 *Guideline*, and SA-3 *Goa* missiles.

**Reserves:** 30,000 men.

# THE SOVIET UNION

## Strategic offensive air arm:

**Manpower:** 100,000 men. 722 fighter aircraft.

**Types of aircraft:** 143 long range bombers: 100 Tu-95 *Bear* and 43 Mya-4 *Bison*, 650 medium range bombers: 220 Tu-16 *Badger G*, 125 Tu-22 *Blinder A* and *B* and 110 Tu-22M *Backfire B*. Flight refuelling aircraft: 30 Mya-4 *Bison* and 18 Tu-16 *Badger*. 90 machines for electronic counter-measures Tu-16 *Badger H* and *J*. 34 reconnaissance machines: 4 Tu-95 *Bear R*, 15 Tu-16 *Badger* and 15 Tu-22 *Blinder C*. **Air-to-ground missiles:** AS-3 *Kangaroo*, AS-4 *Kitchen*, AS5 *Kelt* and AS-6 *Kingfish*.

## Strategic defensive air arm:

**Manpower:** 500,000 men. 1,250 fighter aircraft

**Types of aircraft:** Interceptors: 400 Mig-23 *Flogger*, 30 Mig-25M *Foxhound*, 120 Tu-28P *Fiddler* and 200 Yak-28P *Firebar*, all of which carry air-to-air missiles. Early warning alert aircraft: 10 Tu-126 *Moss*, modified during replacement by the new Il-76 *Mainstay*.

**Training units:** 40 Su-11, 120 Su-15, 20 Mig-15, 60 Mig-17, 50 Mig-23 50 Mig-25 and Yak-28.

**Air-to-air missiles:** AA-2 *Atoll*, AA-3 *Anab*, AA-5 *Ash*, AA-6 *Acrid*, AA-7 *Apex*, AA-8 *Aphid*, and AA-9.

**Anti-aircraft defence:** 10,000 launchers spread over 1,400 sites.

**Missiles:** SA-1 *Guild*, SA-2 *Guideline*, SA-3 *Goa*, SA-4 *Ganef*, SA-6 *Gainful*, SA-7 *Grail*, SA-8 *Gecko*, SA-9 *Gas-kin*.

## Tactical air arm:

**Manpower:** 365,000 men, 5,950 fighter aircraft, 2,300 combat helicopters.

**Types of aircraft:** 2,425 ground attack aircraft: 100 Mig-21 *Fishbed*, 650 Mig-27 *Flogger*, 150 Su-7 *Fitter*, 650 SU-17 *Fitter*, 800 Su-24 *Fencer*, and 75 Su-25 *Frogfoot*.

2,850 fighters: 500 Su-15 *Flagon*, 500 Mig-21 *Fishbed*, 1,750 Mig-23 *Flogger*, 60 Mig-25 *Foxhound*, some Mig-29 *Fulcrum* and Su-27 *Flanker*. 640 reconnaissance aircraft: 150 Mig-25 *Foxbat*, 130 Mig-21 *Fishbed*, 200 Yak-28 *Brewer* and 160 Su-17 *Fitter*, 40 electronic warfare planes, some Yak-28 *Brewer*. 3,450 helicopters: 700 Mi-1 and Mi-2, 50 Mi-4 *Hound*, 400 Mi-6 *Hook*, 1,500 Mi-8 *Hip*, 800 Mi-24 *Hind*, some Mi-26 *Halo* and Mi-9 *Hoop*. 600

*Below A Mig-25 Foxbat at a Soviet base in Eastern Europe.*





transport planes including 375 An-12, 175 Il-76, 55 An-22.  
**Air-to-air missiles:** AA-2 *Atoll*, AA-7 *Apex*, AA-8 *Aphid* and AA-9.

**Fleet air arm:**

**Manpower:** 68,000 men. About 800 fighter aircraft and 300 combat helicopters.

**Types of aircraft:** 260 bombers of different types, including 100 Tu-22 *Backfire*, 220 Tu-16 *Badger* and 40 Tu-22 *Blimder*, 75 attack planes. 40 Yak-36 *Forger* and 35 Su-17

*Fitter*. 190 anti-submarine planes: 50 Tu-142 *Bear*, 50 Il-38, 90 Be-12 and 240 helicopters Mi-14, Ka-25 and Ka-32. 150 reconnaissance and electronic counter measure planes: 90 Tu-16 *Badger*, 45 Tu-95 *Bear*, 5 Tu-22 *Blimder*, 10 An-12.

**Flight refuelling aircraft:**

75-Tu-16 *Badger*, 330 planes and helicopters for transport and training, in particular the An-12, An-26, Il-14, Il-18.

# THE ATLANTIC ALLIANCE



*Above* French *Mirage 2,000* with two Matra 550 *Magic* missiles outboard and two Matra Super 530 missiles inboard. The fuselage also has five weapons attachments *Right* *Mirage 2,000* with air-to-air missiles

## BELGIUM

**Manpower:** 20,500 men (3,600 conscripted). 143 combat aircraft.

**Types of aircraft:** 5 ground attack fighters with 54 *Mirage 5* and 36 F-16. 2 defence squadrons with 36 F-16. 1 reconnaissance squadron equipped with 18 *Mirage 5BR*. 2 transport squadrons with 12 C-130, 2 Boeing 727, 3 HS-748, 5 *Merlin 3A* and 2 *Falcon 20*. 1 squadron of helicopters with 3 DSS-1 and 5 *Sea King*. Training and liaison squadrons with 28 SF-260, 23 Fouga CM-170 and 32 *Alpha Jet*.

**Air-to-air missiles:** *Sidewinder*.

**Anti-aircraft defence:** 54 *Nike Hercules*

**Reserves:** 14,000 men.



## CANADA

**Manpower:** 38,000 men. 150 combat aircraft.

**Types of aircraft:** 3 squadrons equipped with 42 CF-104, 2 squadrons of ground attack fighters with 20 CF-116, 4 CF-116D. 2 squadrons with 4 CF-116, 21 CF-116D, 8 CF-188 and 15 CF-188D. 3 Anti-aircraft defence squadrons with 38 CF-101 *Voodoo*. 1 squadron for electronic warfare with 3 CC-117 and 17 CT-133. 6 squadrons of helicopters with 31 CH-135, 36 CH-136 and 7 CH-147.

**Fleet air arm:** 3 Sea patrol squadrons with 18 CP-140 *Aurora*. 1 Sea reconnaissance squadron with 15 CP-121 *Tracker*. 3 Anti-submarine squadrons, of which 1 training, with 32 CH-124. 2 service squadrons with 9 T-33, 3 CP-121 and two CH-135 helicopters.

**Aerial transport groups:** 5 transport squadrons with 26 CC-130, 5 CC-137 (Boeing 707), 7 CC-109 *Cosmopolitan*, 4 CC-117 *Falcon*, 2 CC-132. 4 Search and rescue transport squadrons with 11 CC-115, 8 CC-138 *Labrador*, 7 CH-113A *Voyageur* and 3 CH-135. 1 helicopter rescue unit with 3 CH-113.

**Training units:** 18 CT-134 *Musketeer*, 14 CH-139, 100 CT-114, 2 CT-134 and 2 CC-129.

## DENMARK

**Manpower:** 7,400 men (1,500 conscripted). About 116 combat aircraft.

**Types of aircraft:** 2 squadrons of ground attack fighters with 32 F-16. 1 squadron of fighter-bombers with 16 F-35XD and 4 TF-35 *Draaken*. 1 reconnaissance squadron with 16 RF-35XD and 4 TF-35 *Draaken*. 2 interceptor squadrons equipped with 32 F-104G. 1 transport squadron with 3 C-130H, 3 *Gulfstream* and 7 Saab T-17. 1 search and rescue squadron with 8 S-16A helicopters.

**Training units:** 15 T-17.

**Anti-aircraft defence:** 24 improved *Hawk*.

**Air-to-air missiles:** *Sidewinder*.

**Air-to-ground missiles:** *Bullpup*.

**Reserves:** 9,400 men.



## FRANCE

**Strategic air arm:**

**Manpower:** 10,600 men.

**Types of aircraft:** 6 strategic bomber squadrons with 34 *Mirage IVA*, 1 reconnaissance squadron with 4 *Mirage IVP*, 1 squadron with *Mirage IIIB* and 1 with 5 *Noratlans N-2501*. 3 flight refuelling squadrons with 11 KC-135F. In reserve 9 *Mirage IVA*.

**Fleet air arm:**

**Manpower:** 13,000 men. 167 combat aircraft, 41 combat helicopters. 2 fighter squadrons equipped with 36 *Super Etendard*. 1 interceptor squadron with 15 F-8E *Crusader*. 2 squadrons of submarine killers with 16 *Alizé*. 1 reconnaissance squadron equipped with 8 *Etendard IVP*. 5 Naval patrol squadrons with 34 *Atlantique* and 2 *Gardian*. 1 unit consisting of 12 *Etendard IVM*, 12 *Magister* and 5 *Alizé*. 3 helicopter squadrons for anti-submarine warfare, with 19 *Lynx*. 2 assault helicopter squadrons with 13 *Super Frelon*. 4 communication sections with 5 *Paris 8*, 6 *Falcon 10 MER*, 11 *Navajo*, 14 *Nord 262*. 2 search and rescue sections, fitted with 20 *Alouette 2* and *Alouette 3*, 3 transport groups with 5 *Nord 262*, 5 *15C-47D*, 8 *EMB-121 Xingu*.

**Air-to-surface missiles:** AM-39 *Exocet*, AS-11, AS-12, AS-37 *Martel*.

**Air-to-air missiles:** R-530 *Sidewinder*, R-550 *Magic*.

**Airforce:**

**Manpower:** 100,400 men including 5,000 women (38,500 conscripted). 522 combat aircraft.

**Types of aircraft:**

– Air Defence Command:

10 fighter squadrons. 2 equipped with 29 *Mirage IIC* 8 with 120 *Mirage F-1C*, 1 squadron with 15 *Mirage F-1B*. 4 units with 30 *Magister* and *Broussard*.

**Anti-aircraft defence:** STRIDA 2 system. Ground-to-air missiles of the *Crotale* type.

**Air-to-air missiles:** R-530, Super 530F, R-550 *Magic*, *Sidewinder*.

– Tactical air force: 5 attack squadrons with 45 *Jaguar* and 30 *Mirage IIIE*, 12 ground attack fighter squadrons equipped with 75 *Mirage IIIE*, 30 *Mirage 5F* and 75 *Jaguar A*. 3 reconnaissance squadrons with 30 *Mirage IIIR/RD* and 15 *Mirage F-1CR*.

**Air-to-ground missiles:** AS-30, AS-37 *Martel*.

**Air-to-air missiles:** R-550, R-530.

– Air transport command: 1 squadron of heavy transport with 4 DC-8F. 6 tactical transport squadrons with 48 *Transall C-160*, 13 C-160 and 25 *Noratlans*, 14 squadrons of light transport and liaison with, in particular, 24 *Nord-262*, 8 *Mystere 20*, 1 *Mystere 50*, 20 *Paris*, 23 *Broussard*, 10 *DHC-6* and 4 *Caravelle*, 5 helicopter squadrons with 32 *Alouette 2*, 23 *Alouette 3* and 21 *Puma*.

– Training units command: This command has about 400 aircraft of which there are 120 *Alpha Jet*, 167 *Magister*, some *Noratlans*.

## GREAT BRITAIN

**Manpower:** 89,827 men (including 5,700 women). 620 combat planes.

**Types of aircraft:** 13 attack squadrons equipped with 26 *Tornado* (and 1 squadron under formation), 45 *Buccaneer* S-2 and 72 *Jaguar*. 3 close support squadrons with 44 *Harrier*, 9 interceptor squadrons with 24 *Lightning* and 87 *Phantom*. 2 reconnaissance squadrons with 24 *Jaguar*. 1 airborne early warning squadron with 6 *Shackleton*. 4



Naval reconnaissance squadrons with 28 *Nimrod*. 4 Flight refuelling squadrons with 15 *Victor K.2*, 14 *Hercules C.1P* and 6 *Vulcan K-2* (being adapted). 1 strategic transport squadron with 11 *VC-10*. 4 tactical transport squadrons with 41 *C-130*. 4 communications squadrons with 6 *HS-125*, 4 *Andover*, 6 *Pembroke*, 13 *Devon*. 3 electronic warfare squadrons with 32 *Canberra*, 3 *Nimrod* and 5 *Andover*. 7 helicopter squadrons with 38 *Wessex*, 26 *Puma*, 24 *CH-47*, 14 *Sea King*. Training units: 50 *Hawk*, 146 *Jet Provost*, 11 *Jetstream*, 112 *Bulldog*, 14 *Wessex*, 23 *Gazelle*. **Air-to-air missiles:** *Sidewinder*, *Sparrow*, *Red Top*, *Firestreak*, *Sky Flash*.

**Air-to-ground missiles:** *Martel*, *Harpoon*.

**Anti-aircraft defence:** *Bloodhound* and *Rapier* missiles.

**Royal Air Force Regiment:** Ground defence squadrons and anti-aircraft defence using *Rapier*, with *Scorpion* and *Spartan* systems light AFVs.

**Reserves:** 29,500 men (active reserves) and 600 volunteers.

## GREECE

**Manpower:** 23,500 men (15,000 conscripted). 287 combat aircraft.

**Types of aircraft:** 6 ground attack squadrons with 52 *A-7H*, 6 *TA-H7*, 15 *F-84* and 41 *F-104 G*. 7 interceptor squadrons with 53 *F-43*, 40 *F-5A/B* and 36 *Mirage F1CG*. 2 reconnaissance squadrons equipped with 30 *RF-84F* and 6 *RF-4E*. 1 marine surveillance squadron with 8 *HU-16B Albatross*, 3 transport squadrons with 12 *C-130H*, 6 *YS-11*, 7 *C-47*, 21 *Noratlant*, 1 *Gulfstream* and 7 *CL-215*. 3 helicopter squadrons with 6 *AB-205 A*, 3 *AB-206 A*, 10 *Bell 47 G*, 8 *UH-19D*, 2 *AB-212*, 10 *CH-47C*.

**Training units:** 4 squadrons with 20 *T-41A*, 24 *T-37B/C* and 38 *T-2E*.

**Air-to-air missiles:** *Sparrow*, *Sidewinder*, *Super Sidewinder*, *Falcon* and *R-550 Magic*.

**Air-to-ground missiles:** *Maverick* and *Bullpup*.

**Anti-aircraft defence:** 1 group equipped with 36 *Nike Ajax*.

**Reserves:** 30,000 men approximately.

## HOLLAND

**Manpower:** 17,500 men (3,900 conscripted). 182 combat aircraft.

**Types of aircraft:** 4 ground attack squadrons with 54 *NF-5A* and 18 *F-104 G*. 3 attack and interception squadrons

equipped with 54 *F-16A/B*. 1 reconnaissance squadron with 18 *RF-104 G*. 1 transport squadron with 12 *F-27*. 1 search and rescue squadron with 4 *Alouette 3*.

**Training units:** 20 planes of the *NF-5B* type.

**Air-to-air missiles:** *AIM-9 Sidewinder*.

**Anti-aircraft defence:** 14 squadrons equipped with improved *Hawk* and *Nike Hercules* missiles.

**Reserves:** 11,500 men.

## ITALY

**Manpower:** 70,600 men (28,300 conscripted). 300 combat aircraft.

**Types of aircraft:** 6 ground attack fighter squadrons equipped with 18 *Tornado*, 54 *F-104s* and 35 *G-91Y*. 1 light attack squadron with 15 *MB-339*. 3 light attack and reconnaissance squadrons with 36 *G-91R/R1/R1A*. 6 interceptor squadrons with 72 *F-104S*. 2 reconnaissance squadrons with 30 *F/RF-104G*. 2 naval patrol squadrons with 14 *Atlantico*. 1 squadron for electronic counter-measures and reconnaissance with 2 *G-222* and 6 *PD-808*. 3 transport squadrons with 32 *G-222* and 10 *C-130H*. 4 liaison squadrons with 16 *P-166M*, 32 *SIAI-208 m*, 8 *PD-808*, 2 *DC-9A* and 2 helicopters *SH-3D*. 1 search and rescue squadron with 15 *AB-204* and 20 *HH-3F* helicopters.

**Training units:** 1 combat training detachment with 7 *Tornado*. 6 squadrons equipped with 60 *G-91*, 70 *MB-326* and 339, 25 *SF-260M* 35 *AB-47* and 3 *AB-204* (helicopters).

**Air-to-air missiles:** *AIM-7E Sparrow*, *AIM-9B Sidewinder*.

**Air-to-ground missiles:** *Kormoran*.

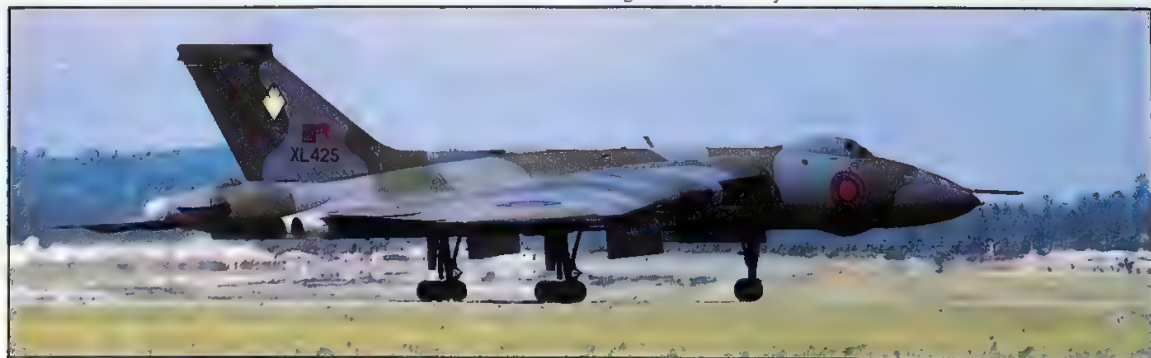
**Anti-aircraft defence:** 8 groups with 96 *Nike Hercules*.

**Reserves:** 28,000 men.



Above A Super Etendard of the French navy.

Below The British Vulcan B-2 bomber which distinguished itself during the Falkland Islands war, carrying out attacks against Port Stanley. Vulcans were retired in 1983.





Above A Tornado of the Italian air force equipped with 8 bombs and 2 Sidewinder missiles.

## LUXEMBOURG

Luxembourg possesses no air force.

## NORWAY

**Manpower:** 9,860 men (5,660 conscripted). 115 combat aircraft.

**Types of aircraft:** 5 ground attack fighters with 36 F-5A and 34 F-16. 1 interceptor squadron with 15 F-16A. 1 reconnaissance unit with 6 RF-5A. 1 naval patrol squadron with 7P-3B. 2 transport squadrons with 6 C-130H, 3 Falcon 20S, 4 DHC-6 and 8 UH-1B helicopters. 1 search and rescue squadron equipped with 10 Sea King MK 43. 2 squadrons (26 machines) of the UH-1B type.

**Training units:** 16 Safari

**Air-to-air missiles:** Sidewinder

**Air-to-ground missiles:** Bullpup.

**Anti-aircraft defence:** 128 Nike Hercules.

**Reserves:** 20,000 men mostly on anti aircraft duties.

## PORTUGAL

**Manpower:** 9,500 men (3,500 conscripted). 74 combat aircraft.

**Types of aircraft:** 3 squadrons of ground attack fighters with 20 A-7P and 50 G-91. 1 reconnaissance squadron with 4 C-212B. 2 transport squadrons with 5C-130H and 12 C-212. 3 search and rescue squadrons with 6 C-212 and 12 Puma helicopters. 2 helicopter squadrons with 37 Alouette 3, 2 liaison squadrons with 32 Reims-Cessna FTB-337G.

**Training units:** 3 squadrons with 2 C-212A, 3 Alouette 3, 24 T-37C and 30 Chipmunk.

## THE FEDERAL REPUBLIC OF GERMANY

**Fleet Air Arm:**

**Manpower:** 6,000 men. 123 combat aircraft.

**Types of aircraft:** 3 squadrons of fighter-bombers with 43 F-104G and 34 Tornado. 1 reconnaissance squadron with 217 FR-104 G. 2 naval patrol squadrons with 14 Atlantic and 5 ELINT Atlantic. 1 squadron of anti-submarine hunters with 12 Sea Lynx. 1 search and rescue squadron with 22 Sea Lynx Mk 41 helicopters. 1 transport squadron with 20 Do-28.

**Air-to-surface missiles:** AS-30 and AS-34 Kormoran.

**Air Force:**

**Manpower:** 105,900 men (40,000 conscripted). 501 combat planes.

**Types of aircraft:** 19 ground attack squadrons with 108 F-104G, 60 F-4F, 30 Tornado, 126 Alpha Jet. 4 interceptor squadrons with 60 F-4F. 4 reconnaissance squadrons with 60 RF-4E. 4 transport squadrons with 86 Transall C-160, 5 helicopter squadrons with 114 UH-1D.

**Training units:** 32 machines including Tornado

**Air-to-air missiles:** Sidewinder.

**Anti-aircraft defence:** 6 regiments equipped with Nike Hercules and improved Hawk.

**Reserves:** 100,000 men.

## SPAIN

**Manpower:** 33,000 men. 215 combat aircraft.

**Types of aircraft:** 6 interceptor squadrons with 40 F-4C, 27 Mirage 3E, 49 Mirage F1CE. 2 ground attack squadrons with 14 F-5A, 15 RF-5A and 6 F-5B. 1 reconnaissance squadron with 9 AR-10C. 1 naval patrol squadron with 6P-3A. 1 ground attack squadron with 24 Mirage F-1C. 3 search and rescue squadrons with 3 F-27-400, 17 AB-205, 4 Do-27, 12 Super Puma, 4 AB-206, 3 AB-47 and 3 Alouette 3. 6 Transport squadrons with 5 C-130H, 6 CASA-207 Azor, 32 C-212, 12 DHC-4 and 10 Do-27. 3 support squadrons with 14 CL-215, 2 Do-27, 5 C-212, 2 DHC-4 and 8 C-7.

**Fleet air arm:** 11 combat planes and 40 helicopters. 9 AV-8A Matador, 2TAV-8A, 4 Comanche, 2 Citation, 5 squadrons of combat helicopters of which for anti-submarine work equipped with AB-212, Hughes 500 HM, SH-3D and Bell 47G.

Below A West German Tornado equipped with an MW1 system, multirole sub-munitions dispenser. The MW1 is very effective against armour.





## TURKEY

**Manpower:** 53,000 men (33,000 conscripted). 340 combat aircraft.

**Types of aircraft:** 13 ground attack squadrons with 42 F-5A, 12 F-5B, 40 F-100, 82 F-4E, 8 RF-4E and 50 F-104 G, 2 interceptor squadrons equipped with 30 F-104S. 1 reconnaissance squadron with 20 RF-5A/B. 6 transport squadrons with 7 C-130, 20 C-160, 30 C-47, 3 *Viscount*, 2 *Iceland* and UH-1D and UH-19D helicopters.

**Training units:** 3 squadrons with 24 T-34, 25 T-37, 60 T-38 and 20 T-41.

**Air-to-air missiles:** *Sidewinder*, AIM-9P3 *Super Sidewinder*, *Sparrow*, *Falcon*, *Shafir*.

**Air-to-ground missiles:** *Bullpup*, *Maverick*.

**Anti-aircraft defence:** 8 squadrons equipped with the *Nike Hercules* system.

**Reserves:** 66,000 men.

## THE UNITED STATES

### Strategic Offensive Air Forces:

**Manpower:** 118,000 men for Strategic Air Command. 356 combat planes.

**Types of aircraft:** 272 long range bombers of the B-52G and B-52H types. 56 intermediate bombers of the FB-111 A type.

**Air-to-ground missiles:** AGM-69 A, SRAM and the AGM-86 B ALCM types. Command and reconnaissance force: 1 squadron with 9 SR-71 A. 1 squadron with 8 U-2CT. 1 squadron with 7 TR-1 A. 1 squadron with 4 E-4 and 4 squadrons with 16 RC-135, 21 EC-135.

**Flight refuelling:** 34 squadrons with 615 KC-135 and 14 KC-10.

### Strategic Defensive Air Forces:

**Strength:** 261 interceptor aircraft.

**Types of aircraft:** 5 active air force squadrons with 72 F-106 and 18 F-15. 10 squadrons of the Air National Guard with 90 F-4 and 81 F-106.

**Air-to-air missiles:** *Genie*, *Falcon*, *Super Falcon*, *Sidewinder*, *Sparrow*.

### Fleet Air Arm:

**Strength:** 1,450 combat machines and 160 combat helicopters

**Types of aircraft:** 24 fighter squadrons with 240 F-14A and 48 F-4. 36 attack squadrons equipped with 120 A-6, 48 KA-6D and 288 A-7E. 24 marine reconnaissance squadrons with 45 P-3B and 171 P-3C. 11 anti-submarine squadrons with 110-3A *Viking*, 9 advanced aerial alert squadrons with 36 EA-6B *Prowler* and 12 others with 48 E-2C *Hawkeye*. 17 anti-submarine helicopter squadrons with 66 SH-3D/H, 60 SH-2F LAMPS, 16 transport squadrons with 210 T-34C, 112 TH-57 A.

**Air-to-air missiles:** *Sparrow*, AIM 54A, AIM-54C, *Phoenix*, *Sidewinder*.

**Air-to-ground missiles:** *Standard ARM*, *Shrike*, AGM-88A, *HARM Walleye*, *Harpoon*.

### US Marine Corps:

**Manpower:** 35,600 men. 436 combat machines, 102 combat helicopters.

**Types of aircraft:** 12 fighter squadrons with 108 F-4N and 36 F-18. 13 squadrons of ground attack fighters with 45 AV-8 *Harrier*, 95 A-4M and 50 A-6E. 1 reconnaissance squadron with 21 RF-4B. 1 squadron for electronic counter measures with 15 EA-6B. 2 observation squadrons with 36 OV-10A, 3 flight refuelling squadrons with 36 KC-



Above A British-built *Buccaneer*, low-level strike aircraft armed with air-to-air *Sidewinder* missiles. The *Buccaneer* has a crew of two (pilot and observer) and a range of some 3,700 km, though a non-stop flight of nine hours with two in-flight re-fuellings has been recorded.

130, 29 helicopter squadrons which include 72 AH-1, 72 UH-1, 180 CH-46F, 128 CH-53.

**Air-to-air missiles:** *Sparrow* and *Sidewinder*.

**Air-to-ground missiles:** *Maverick*

**Anti-aircraft defence:** Improved *Hawk*.

### Tactical air forces:

**Manpower** 592,000 men (including 63,900 women). 3,700 combat aircraft.

**Types of aircraft:** 82 fighter squadrons including: 528 F-4, 376 F-15, 360 F-16, 84 F-4G, 252 F-111, 288 A-10. 6 tactical reconnaissance squadrons with 126 RF-4C. 3 AWACS squadrons with 29 E-3A/B *Sentry*. 11 tactical aerial control squadrons with 96 OV-10, 7 EC-130E, 11 EC-135K and 27 CH-3 helicopters. 7 squadrons for special missions with 13 MC-130, 20 AC-130, 6 CH-3. 14 tactical transport squadrons with 218 C-130. 17 heavy transport squadrons with 70 C-5a and 252 C-141B. 3 medical transport squadrons with 19 C-9. 3 weather observation squadrons with 13 WC-130 and WC-135. 10 search and rescue squadrons with 20 HC-130, 76 UH-1, 5 UH-60.

**Training units:** 30 squadrons with 8 F-16, 120 T-33, 619 T-37, 620 T-38, 112 T-39.

**Air-to-air missiles:** AIM-9/H and AIM-9L/M *Sidewinder* and AIM-7F *Sparrow*.

**Air-to-ground missiles:** *Maverick*, *Standard ARM*, *Shrike*, *HARM*, GBU-15 glide bomb.



*Top right* A McDonnell Douglas F-15 Eagle of the USAF. With the FAST pack it has a range of 6,000 km carrying a range of air-to-air weapons. It has one 20 mm M61A1 six-barrel gun. *Above right* A General Dynamics F-16A Fighting Falcon of the USAF. With its Sidewinder missiles it can reach Mach 1.95 or 2,090 km/h. *Above* A Hercules C-130 being refuelled on the ground.





# THE NAVIES

## THE WARSAW PACT AGAINST NATO The rulers of the sea

*Each country and each alliance has always tried to adapt the power of its navy to the mission or missions which are assigned to it. Naval policy must be integrated and harmonised with that of the air and land forces. This arrangement shapes the priorities which determine the type and number of surface ships or of submarines which each country feels it needs.*

*In the East, the Soviet Navy is, by far, the largest naval force of the Warsaw Pact, with the result that the Polish, East German, Bulgarian and Rumanian forces are of little consequence. In the West that is not the case. While the US Navy is by far the largest, those of Great Britain and France are not exactly small. Nuclear missile-armed submarines make them an especially valuable weapon in a general conflict. Today's offensive and defensive armament makes the largest naval units into veritable floating fortresses.*



# THE WARSAW PACT NAVIES



Above The Soviet aircraft carrier *Kiev* shadowed by a British *Nimrod*. Inset The Soviet aircraft carrier *Minsk*.

The navies of the Eastern bloc have one undisputed leader: the USSR. The colossal naval power of the Soviets has two missions. It must first protect the territories of the members states of the Warsaw Pact from any attack from the sea, and in this it is helped by the different fleets of the member countries: Poland, East Germany, Bulgaria and Rumania. It must also, in the event of an armed attack against the NATO powers, neutralise their navies as quickly as possible.

## The Soviet effort

The Soviets, during the last few years have concentrated on an intense ship-building programme, which includes 7 classes of surface ship and 5 classes of submarine as well as several types of aeroplane.

Among the priorities, mention must be made of the entry into service during 1984 of a fourth aircraft carrier of the *Kiev* class. The Soviets have also gone ahead with the building of a large nuclear aircraft carrier, and the first member of this class should appear during the late 1980s. This policy seems to indicate that it is Moscow's intention to fill the last gap in their naval forces, the weakness of its fleet air arm. At present the Soviet units rely to a large extent on land-based aircraft for protecting their fleets.

Also included in the list of naval developments is an increase in the number of nuclear-powered *Kirov* cruisers class and of *Sovremenny* and *Udaloy* class destroyers.

NATO is today wondering why the Soviet Union is putting so much effort into becoming the leading naval power in the world. This supremacy is not yet effective, and it is the United States which remains the leader. This "tonnage" race carried out by the USSR should not make one forget that in some respects the Eastern bloc navies leave a lot to be desired, in particular the training of their crews.

Days spent at sea are fewer than those spent by the western navies. At the same time, the crews of the Soviet ships are made up mostly of conscripts whose technical knowledge must remain questionable.

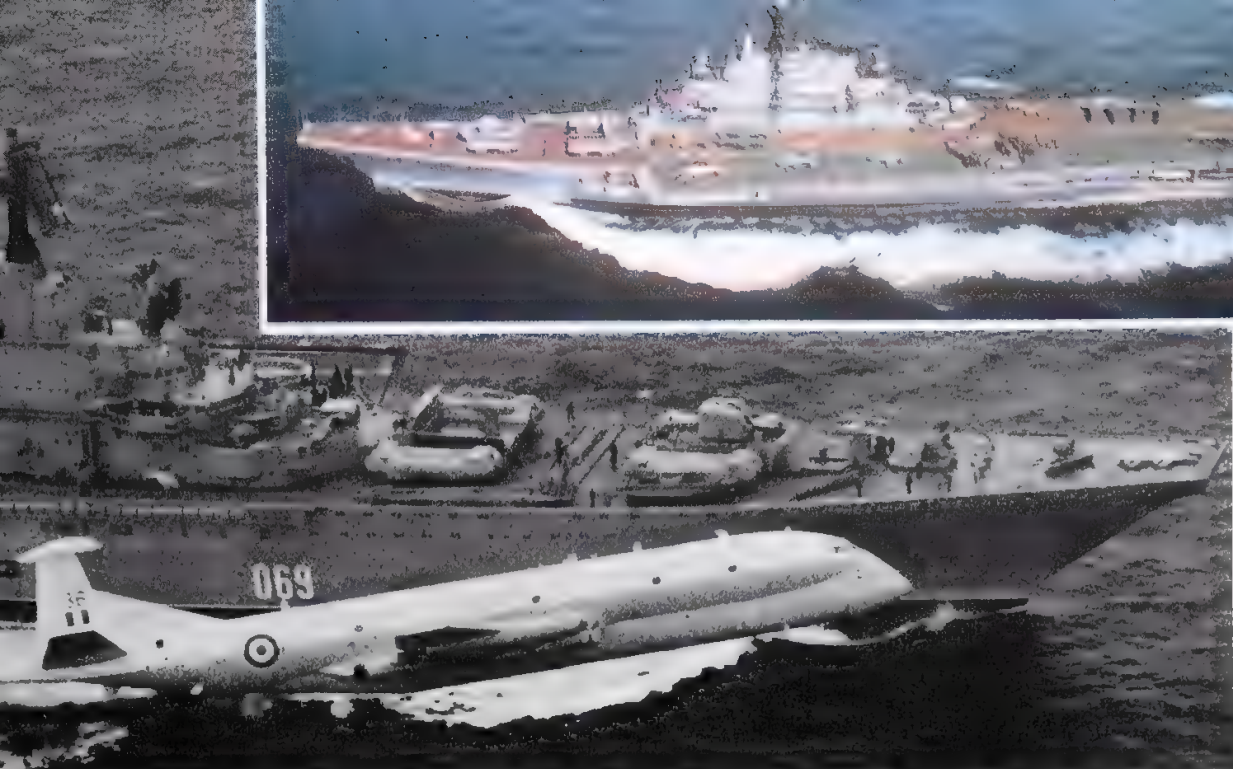
## A powerful submarine force

For many years the Soviets have devoted a great deal of research and development to their submarines. There are four types: nuclear-powered submarines which launch ballistic missiles, the SSBN; nuclear-powered submarines equipped with cruise missiles, the SSGN; nuclear-powered attack submarine, the SSN; and the attack submarine with conventional propulsion, the SS.

In tonnage they represent 55.4 per cent of the Russian navy (as against 26.7 per cent for the United States). In the event of World War these vessels will have two priority missions: first to try and interrupt maritime traffic between the United States and Europe, in order to stop the flow of reinforcements from west to east; second, to prevent the powerful American carriers from approaching the Russian coast. Mention must also be made of the commissioning of the largest submarine in the world, the *Typhoon*, a submarine whose main duty is not to dive deeper but to stay close to its base. It can fire the most devastating missile – the SS-N-20 – which will directly threaten every NATO country while itself remaining safe, deep in the Barents Sea. Among the Soviet attack submarines, account must be taken of nuclear-powered boats which can launch *Oscar* class anti-ship missiles. These carry 24 SS-N-19 cruise missiles, with a range of 500 kms.

## The principal Soviet submarines

Particulars of the two most formidable submarines, the nuclear-powered strategic submarines and nuclear-pow-



ered cruise missile launchers, have already been listed. Here, we will only give details of the attack submarines with nuclear or conventional propulsion.

### SSN November class

The *November* class of submarine was the first to have nuclear propulsion, and they came into service from 1962 onwards. There are still, today, some ten which remain operational. Each has a crew of 86 men. This class of submarine is 110 m in length, 9 m wide and draws 6.7 m of water. Their submerged weight is about 5,000 tonnes. They each have 533 mm torpedo tubes at the bows and two of 406 mm at the stern.

### SSN Victor class

Three versions of *Victor* were built, starting in 1966. The latest, *Victor III*, was first launched in 1976, and there are today nearly 30 members of this type in service. This submarine requires a crew of between 100 and 120 – according to the version. The latest type of *Victor* for which there is information available is 103 m long, 10 m wide and draws 7.3 m of water. Each *Victor* is fitted with 533 mm torpedo tubes.

### SSN Alfa class

The first launch of an *Alfa* took place in 1970, and there are three in service today. This is the smallest of the three SSN attack submarines. Its length is 79 m, its width is 10 m and it draws 7.5 m of water. Its crew numbers 60. Its speed under water can reach 75 km/h – which is much faster than either the *Victor* or the *November* classes, which normally travel at a maximum speed of 60 and 55 km/h, respectively.

### SS Zulu class

This submarine has conventional propulsion (electric motors and diesel engines) and was launched in 1951. There are 12 of them still in service. Its length is 90 m, its width is 7.4 m and it draws 6 m of water. It is armed with 10 533 mm torpedo tubes and, under water, it reaches a speed of 35 km/h. It has a crew of 75 men.

### SS Whisky class

The first of the *Whisky* class was launched in the 1950s and there are still 50 operational. It displaces 1,350 tonnes under water, and is fitted with two diesel motors of 4,000 hp and two electric motors of 2,700 hp. Its speed under water is low, about 25 km/h. The *Whisky* has a length of 75 m, a width of 6.5 m and it draws 5 m of water. Its crew is 54, and it is fitted with 4 533 mm torpedo tubes and 4 406 mm tubes.

### SS Foxtrot class

There are 60 *Foxtrot* class at present in service; the first appeared in 1958. When submerged it displaces 2,500 tonnes, has a length of 91 m, a width of 8 m and draws 6 m of water. It has 6 533 mm torpedo tubes in the bows and 4 of 406 mm in the stern. When submerged its maximum speed is only 30 km/h. It has a crew of 78 men.

### SS Romeo class

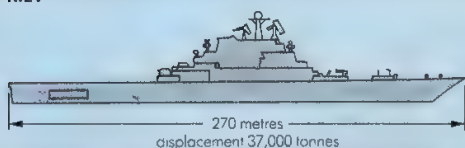
There are still about 12 of this class operational. It has been in service since 1958; it displaces 1,700 tonnes, its length is 77 m, its width is 6.7 m, and its draught 4.9 m. When submerged, the *Romeo* has a speed of 25 km/h. Its armaments consists of 8 533 mm torpedo tubes, and they have a crew of 54.



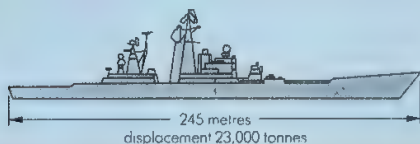


### Principal surface ships

#### KIEV



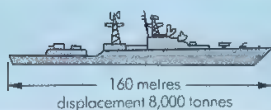
#### KIROV



#### KRASINA



#### UDALOY



#### SOVREMENNY



Top A Soviet guided-missile destroyer of the *Kashin* class.  
Left Table grouping the main surface ships of the USSR.  
Above Stern view of the aircraft carrier *Kiev*.

### SS Tango class

This is the latest of the conventional attack submarines. They were first seen by NATO observers at the Sevastopol Naval Review of 1973. The first 15 to be built are still operational. The *Tango* displaces around 4,000 tonnes when submerged. Its length is 92 m, its width is 9 m and it draws 7 m of water. It has 8 533 mm torpedo tubes. Its submerged speed does not exceed 30 km/h. It has a complement of 62.

The *Tango* class submarine was introduced to replace the existing *Foxtrot* class, and shows the Soviets' continued commitment to non-nuclear powered submarines. In fact, this class of submarine is of a very advanced design and is used to cover the very large areas of shallow water that surround the USSR – areas that would be difficult for nuclear-powered submarines to patrol. They also provide quiet listening platforms.

As far as is known, *Tango* class submarines are stationed with the Northern and Black Sea Fleets and deployed in the Mediterranean. They are equipped with Snoop Tray radar and are believed to be capable of launching the SS-N-15 weapon – a rocket-assisted torpedo part of whose flight is in the air. This is the Soviet equivalent to SUBROC.

# The main Soviet surface ships

## Kiev class aircraft carriers

The first member of this class of aircraft carrier was launched in 1972, and today two more are in service, while a fourth will join them during 1985. The *Kiev*, with its 274 m flight deck, has 12 *Forger* aircraft and 16 helicopters. Its defensive weaponry consists of SS-N-12, SA-N-3 and SA-N-4 missiles backed up by a wide range of guns. Its complement is 1,600 men. This ship is in no way comparable with American 'super' carriers. It should, however, be remembered that the USSR has started to build an aircraft carrier of 60,000 tonnes (as against 36,000 for the *Kiev*) with nuclear-power. It will be able to carry some 60 aircraft, and helicopters.

## Moskva class helicopter-carrier/cruiser

The first member of this class was launched in 1962, and has a length of 190 m, and a flight deck of 34 m. It is provided with 16 helicopters. Its defensive system is based on two surface-to-air missile launchers of the AS-N-3 type. Like the *Kiev*, the *Moskva* has very sophisticated electronic equipment. It displaces 14,500 tonnes.

## Kirov class nuclear-powered cruiser

The *Kirov* is one of the master-pieces of the Soviet navy. The first member of the class came into service during 1980. It has a length of 250 m, and displaces 25,000 tonnes. Its crew numbers 800. It can carry 3 helicopters, but its main armament consists of a wide variety of missiles including: SS-N-19, SA-N-6 and SA-N-4. This ship is the most powerful cruiser in the world.

## Udaloy class guided-missile destroyer

The first of this class was launched in 1981, and is provided with very advanced electronic equipment. It displaces 8,700 tonnes and has a length of 163.5 m. Its complement is 300. Its armament is designed for anti-submarine work. It is equipped with SS-N-14 missile systems, but also has a battery of surface-to-air missiles for air defence.

## An enormous potential

These few ships and submarines are only a part of the enormous Russian fleet of 375 ships. We shall set out in detail, later on, the composition of this powerful Soviet armada as well as the contributions made by the members of the Warsaw Pact, except for Hungary and Czechoslovakia which do not possess navies



Above A Soviet guided-missile destroyer of the *Krivak* class. There are two types of *Krivak* destroyer: the *Krivak I* and the *Krivak II*. Their gas-turbine engines gives them rapid acceleration and they are armed with 40 missiles a-piece, carry 8-21 533 mm torpedoes, have an operational range of 4,600 miles and a crew of 220



# THE NATO FLEETS



Within the overall structure of the North Atlantic Alliance the US fleet is clearly the most important. It has superiority in numbers, and in addition, countries such as Great Britain, Italy and West Germany, as well as France contribute to the NATO potential much more than ordinary support. Some of their units have as much to be proud of as the most advanced Soviet or United States navies.

In the event of a general conflict in Europe, the duties of the US 2nd Fleet, with reinforcements from the different European navies, will be numerous. The striking power represented by the aircraft carriers will cover amphibious operations to be developed on NATO's flanks. It will also contribute, with the other surface ships, to the neutralisation of Soviet naval forces which could threaten the Atlantic reinforcement of Europe. The NATO forces will do everything in their power to destroy the numerous Soviet submarines trying to prevent convoys from crossing the Atlantic. But the war at sea, if it breaks out, will not be limited to the Atlantic. In the Mediterranean and the North-West Pacific, the Atlantic Alliance will also challenge and neutralise the Russian units as quickly as possible.

## Washington's reply

Washington was not long in replying to the rapid expansion of the Soviet navy. The Reagan administration took a number of measures designed to maintain supremacy over the seas. A huge programme of modernisation and renewal has been undertaken. The main priority has been to install cruise missiles in the large surface ships, as well as to modernise anti-aircraft and anti-missile defences.

On the level of the general organisation of the fleet, it can be said that it has been designed to control the oceans, while the Soviet navy has been assigned the duty of shadowing the American navy wherever it goes. There is also a second difference between these giants. The American navy, thanks to its aircraft carriers, is almost completely independent of shore bases. For the Soviets, the



*Above left* The American battleship *New Jersey* firing its 406 mm guns. *Above* Nuclear-powered attack submarine, the USS *Trepan*. *Below* *Viking*, waiting with wings folded back, on board the aircraft carrier USS *Eisenhower*.



situation is quite the reverse: they cannot separate their navy from their land-based airforces. This difference also extends to the level of the command structures of the two navies.

## The main NATO submarines

Here we will only refer to the main nuclear-power (SSN) or conventional (SS) classes of attack submarine. Unlike the Soviet Union, the only Eastern bloc power to be building submarines, the navies of the Atlantic Alliance have a large variety of types, coming from the numerous member countries of the NATO military organisation, and from France. Three countries are equipped with SSN: the United States, Great Britain and France.

## SSN Skipjack class

This is the oldest nuclear-powered attack submarine in service with the US Navy. It was first launched at the end



Above The American Navy SH-60B *Seahawk*. Below The anti-submarine version of the Italian *Agusta A-212*.



of the 1950s. This is a small submarine having a length of 76.5 m, a width of 9.6 m and a draught of 8.9 m. It has 6 533 mm torpedo tubes. When submerged it can reach a speed of 55 km/h. Its complement is 93 men.

### SSN Los Angeles class (USA)

Several classes of SSN were launched in the United States between the original *Skipjack* and the current *Los Angeles* classes, the best-known being *Nautilus*, *Skate*, *Sturgeon*, *Tullibee* and *Permit*. 19 *Los Angeles* class SSNs have been launched and this family represents the culmination of years of research undertaken in the USA to reduce the level of noise created by submarines. Its length is 110 m, its beam 10 m, and it draws 9.8 m of water. When submerged it can reach a speed of 55.5 km/h. It has a formidable armament; it carries *Harpoon* and *Tomahawk* missiles which can be launched from its four standard 533 mm torpedo tubes. It has a crew of 127.

### SSN Swiftsure class (GB)

This represents the third generation of British SSN. It was preceded by *Dreadnought* and *Valiant*, but today the *Trafalgar* class, the most recent, is entering service. HMS *Swiftsure* has a length of 83 m, a beam of 9.8 m and she draws 8.2 m of water. She has 5 533 mm torpedo tubes and her submerged speed is 56 km/h. She carries a crew of 97 men.

### SSN Rubis class (France)

Side-by-side with the NATO military organisation, France has developed her own strike force, and during 1979 she launched the first member of the *Rubis* class, the only SSU yet in French service. She is 72.1 m long, 7.6 m wide and draws 6.4 m. Like the USS *Los Angeles*, she is equipped with 4 533 mm torpedo tubes. She carries a crew of 66 men and has an underwater speed of 46 km/h.

Where conventionally propelled submarines are concerned, NATO can command no less than 15 different classes built by 7 different nations.





Above A Royal Navy *Invincible* class aircraft carrier. Top right The USS *Merrill*, an American missile-carrying destroyer. Centre The USS *South Carolina*, a guided-missile cruiser of the US 6th fleet. Bottom right A support ship of the US Navy off Diego Garcia in the Indian Queen.

### SS Delfinen class (Denmark)

The *Delfinen* class were the first submarines designed by Denmark. Launched from 1956 onwards 4 are still in service. Their length is 54 m, their beam 4.7 m and they draw 4 m of water. This small submarine has a crew of 33. Its speed when submerged is only 30 km/h. It has four 533 mm torpedo tubes.

### SS class 209 (West Germany)

The 209 is one of 5 different classes of conventional attack submarine in service with this country. The others are the 205, 206, 207 and IKL 540. The 209 is 54.4 m long, has a beam of 6.2 m and draws 5.5 m. Its submerged speed can reach a top speed of 43 km/h. It has 8 torpedo tubes and carries a crew of 33.

### SS Nazario Sauro class (Italy)

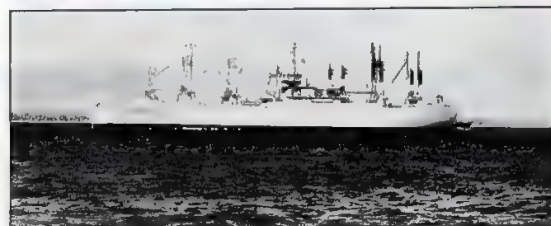
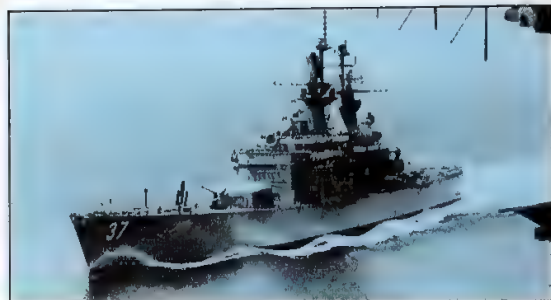
This is one of two Italian classes of conventional service submarine. The other, the *Enrico Toti*, is older, having entered service in 1967. The *Nazario Sauro* class was commissioned towards the end of the 1970s. Her length is 64 m, her beam is 6.8 m, and she draws 5.7 m. She has six 533 mm torpedo tubes. Her submerged speed can reach 37 km/h and her complement is 45 men.

### SS Vickers Type 2400 (GB)

The *Vickers* type 2400, now being built, was preceded in Great Britain by the *Porpoise* and *Oberon* classes. The *Vickers* design has a length of 70.2 m, a beam of 7.6 m and draws 7.5 m. It is fitted with six 533 mm torpedo tubes, carries a crew of 46, and has a submerged speed of 37 km/h.

### SS Guppy 3 class (USA)

All the submarines in this class were launched before 1962. The main sub-classes are the *Balao*, *Abato*, *Tang*, *Darter*, *Grayback*, *Berbel*. *Guppy 3* is a redesign of the *Balao* class submarines. This class has the following characteristics: length 99.5 m, beam 8.2 m and draught 5.2 m. This submarine is fitted with ten 533 mm torpedo tubes. Its submerged speed is only 28 km/h, and her full complement is 86 men.



### SS Agosta class (France)

This is the latest conventionally powered French class, and it follows the *Narval*, *Arethuse* and *Daphne* classes. The first member of the *Agosta* class joined the French fleet in 1977. Its length is 67.5 m, its beam is 6.8 m and it draws 5.4 m. It is fitted with four 533 mm torpedo tubes. Its submerged speed is 37 km/h and it carries a crew of 52.

## The main surface ships of NATO

### Nimitz class aircraft carriers (USA)

This naval giant was first commissioned during 1975 and three of the class are now operational. At 96,000 tonnes, it is the largest aircraft carrier in the world, and its flight deck is 327 m long. It is nuclear-powered and is fitted with 4 engines developing 280,000 hp. Its crew is 6,286. Its offensive armament is unprecedented: it carries 90 aircraft of different types – F-14 *Tomcat* interceptors, F/A-18 fighter-bombers and A-6E *Intruder* attack aircraft. An improved version of the *Nimitz* class is now being built, and

the first, the *USS Theodore Roosevelt*, will be commissioned during 1987. It too will displace 96,000 tonnes and will also be equipped with *Sea Sparrow* surface-to-air missiles. The other members of the *Nimitz* class are only slightly less impressive, except for *Enterprise* which is just as formidable as *Nimitz* herself. The electronic equipment of all these ships is continually being renewed and improved.

### Foch class aircraft carriers (France)

France now has two ships of this type. The *Clemenceau*, the eldest, was launched in 1957, and the second, the *Foch*, was commissioned in 1963. Both have recently been completely refitted. *Foch* has a length of 265 m and, when fully loaded, displaces more than 30,000 tonnes. In times of peace her crew varies between 984 and 1,338. She has a huge array of electronic equipment. *Foch* can carry 40 aircraft of different types: *Etendard IVP*, *Super Etendard*, F-8E *Crusader*, *Alizé* and *Alouette*. These carriers, it must be mentioned, are not part of NATO's order of battle.

### Invincible class aircraft carriers (GB)

*Invincible* is the largest ship in the Royal Navy, and there are two members of the class in service. There will be a third from 1985. When loaded, this aircraft carrier displaces around 20,000 tonnes. Its length is 206 m and its complement is 998 men. It is fitted with the *Sea Dart* surface-to-air missile system. It can carry 14 aircraft: 5 *Sea Harrier* jets and 9 *Sea King* helicopters. The *Invincible* class is the command ship in an anti-submarine battle group.

### Iowa class battleship (USA)

In reply to the launching by the Soviets of the *Kirov* class of cruisers, the US government decided to recommission its enormous battleships which were put into reserve in 1955. At the moment, only the *New Jersey* is operational, but the others are undergoing refitting and work-up. They are equipped with new armament and very modern electronic devices. They all displace more than 57,000 tonnes when loaded and are 270 m long. The *New Jersey* has two types of missile launchers for *Harpoon* and *Tomahawk* systems, three turrets each with three 406 mm guns and twelve 127 mm guns. These enormous ships can also take 4 SH-60B *Sea Hawk* helicopters. Their full complement of men is 1,552.

### Virginia class nuclear cruisers (USA)

The main armament of these nuclear-powered cruisers are the *Harpoon* surface-to-surface missiles, Standard 1 surface-to-air missiles and *Asroc* anti-submarine missiles. With a length of 177 m, *Virginia* displaces more than 10,000 tonnes when loaded. Her crew is 472 men, and she can carry 2 SH-2F *Sea Sprite* anti-submarine helicopters.

### Type 82 guided-missile light cruisers (GB)

HMS *Bristol* entered service during 1973. She is 154.6 m long and displaces some 7,100 tonnes when loaded. Her crew is 407 men, and her armament is made up mainly of *Sea Dart* surface-to-air and *Ikara* anti-submarine missiles. The Royal Navy also has two light *County* class guided missile. They displace about 1,000 tonnes less than the *Bristol*, and are equipped with *Sea Slug* and *Sea Cat* missiles.



Above The *USS New Jersey* leaving the naval yards at Long Beach. The *New Jersey*—one of the largest battleships ever built—first saw action in the Pacific in World War II. Her most recent sortie was the bombardment of the Lebanese coast in 1984.

### Colbert class missile launching cruiser (France)

The *Colbert* is France's only guided-missile cruiser. She came into service in 1959, but over the years has had a number of technical and electronic modifications which make it today a formidable platform for medium range anti-aircraft defence on the high seas. She is equipped with the surface-to-air *Masurca* missile system and with launchers for MM38 *Exocet* missiles. When fully loaded she displaces 11,300 tonnes. Her length is 180 m and her crew numbers 562.

### A simple example

The submarines and surface ships described above are only part of the enormous fleet at the disposal of NATO and France. Further on we shall give details of the sea power available to all the NATO countries, with the exception of Luxembourg which has no navy.



Above HMS *Cardiff*, the guided-missile light cruiser, in Stanley harbour, the Falklands. The *Cardiff* is armed with *Sea Dart* and a *Lynx* helicopter equipped for anti-submarine warfare. Her blue anti-fouling streak is distinctive.



# MISSILES LAUNCHED BY THE NAVY



# SURFACE-TO-SURFACE TACTICAL MISSILES

## The era of the electronic war

*With the advent of the ship-borne missile, naval strategy has been totally changed. Today's surface-to-surface, surface-to-air or anti-submarine missiles are now remarkably accurate. The war in the Falklands between the Argentines and Great Britain has, furthermore, shown on a reduced scale how a naval battle could develop in the event of a wider conflict. Reliability and accuracy in the guidance system is the essential requisite of these missiles. At this level, an incredible degree of sophistication has been reached in which electronics play the main part.*



Left Illustration showing 'cruise mode' surface-to surface missile making for its target at wave-top height.

Top right Firing a Sea Sparrow missile. Above Soviet SS-N-2 Styx missile in its launching tube.



## The Atlantic Alliance

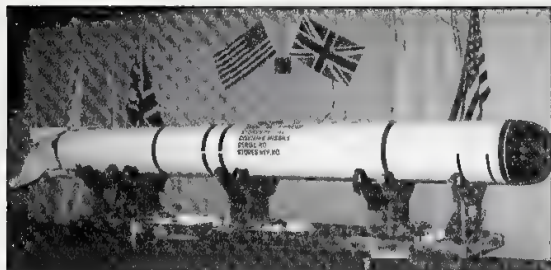
Here we will restrict ourselves to describing the anti-ship missiles; but at the same time, it must not be forgotten that some ships are provided with missiles which can reach objectives on land. France began design studies of these surface-to-surface missiles with the launching of the SS.11M, a ship-borne version of an anti-tank missile. It was followed at the start of the '60s by the SS.12M, a formidable wing-guided missile with a range of several kilometres. At the start of the '70s Aerospatiale brought out the *Exocet* which was quickly adopted by the French navy. Its excellent performance was well illustrated in the Falklands War. It has a length of 5.64 m, a diameter of 0.35 m, and a wingspan of 1 m, and on launching it weighs 825 kg. Its range can be up to 70 km. France and Italy are jointly developing the *Otomat*, a missile 4.8 m long and 0.4 m in diameter and having cruciform wings with a span of 1.19 m. Its weight on launching is 770 kg, and its range can exceed 100 km. At the same time, Italy has perfected the *Sea Killer*, a missile of 4.7 m in length, a diameter of 0.2 m and weighing 300 kg at launch. Its maximum range is 25 km. This missile is guided initially by a radar-controlled firing system and, in the homing phase, by radio commands which allow course corrections in mid-flight. It has also a radio altimeter which allows it to maintain a constant height above the surface.

Norway produced the *Penguin* in the early 1960s. It is 3 m long, has a diameter of 0.28 m and a wingspan of 1.4 m and has a launch weight of 350 kg. Its range varies according to the version, Mk 1 or Mk 2, from 20 to 30 km, respectively. It is fitted with an inertial guidance system. At the end of its flight, an infra-red seeker allows the missile to detect the heat emitted by its target.

Great Britain had not, until recently developed a surface-to-surface missile, but the United States wasted



little time in perfecting such a device. In 1946, a marine version of the JB-2 was produced – a ground-to-ground missile based on the German V-1. It was called LOON. At the start of the '70s, the RGM-66D was produced by the US, and was derived from an existing anti-aircraft missile. However, the most important. American surface-to-surface missile today is the *Harpoon*, which came out in 1978. Designed originally as an air-to-surface missile, it was also adapted for launching from a ship. It is 4.6 m long, has a diameter of 0.34 m, a wingspan of 0.76 m, and its weight on launching is 670 kg. Its maximum range is 110 km. Like every missile in this category, it has a very sophisticated guidance mechanism. In front, in its nose, it combines an active radar, an inertia guidance system, a radar altimeter, and a mid-course guidance device. At present the US Naval Sea System Command is conducting a series of trials aimed at destroying targets well over the horizon.



## The Warsaw Pact

For their part, the Soviets have examined and developed a number of systems in the SS-N range. The first Russian naval cruise missile was produced at the start of the '50s, and was known as the SS-N-1 *Scrubber*. In order to reach a high enough speed it required a long launching rail. Its successor, the SS-N-2 *Styx* had the appearance of a small aeroplane with a wingspan of 2.8 m; its length was 6.25 m and its diameter 0.75 m. Its weight was 2,500 kg and its maximum range was about 40 km. The SS-N-3, which is as old as the two previous missiles, is more formidable, and it certainly looks it. Its weight is 4,500 kg on launching its length is 13 m, its diameter 1 m and its wingspan is 21.1 m. Its maximum operational range is around 200 km. The SS-N-7 *Siren* and the SS-N-9 are hardly known. Their performances and purpose are the subject of speculation among specialists in NATO. However it is known that the SS-N-9 is used exclusively to equip a class of missile patrol boats. The specialists believe too that this missile has a manual guidance system and an automatic radar or an infra-red seeker which steers the missile towards its target automatically.

It seems that the SS-N-11 is derived from the SS-N-2 *Styx*. Its performance is much better than that of its predecessor, even though they are similar in appearance.

Top left A Harpoon surface-to-surface missile. Left A drawing of an RBS-15 missile. Below A Harpoon missile just after being fired from the USS *Fletcher*.



# SURFACE-TO-AIR MISSILES



HMS *Broadside*, Royal Navy, launches a GWS25 Sea Wolf SAM. *Inset* USS *Camden*, US Navy, launches a Sea Sparrow.

## The Atlantic Alliance

France tested its first surface-to-air missile, the *Masurca*, in 1955. From the launch, this missile uses a first stage motor which enables it to reach supersonic speeds, then a second stage motor which enables it to maintain that speed. The Mark 3 version is still in service today on some cruisers and frigates. At launch, its length is 8.6 m, its diameter 0.4 m and its wingspan 0.8 m and it weighs about 2 tonnes. Its speed exceeds Mach 3, and its range is 50 km. The *Naval Crotale* was adopted by the French navy during the '70s. Its length is 2.9 m, its diameter 0.16 m and its wingspan 0.5 m; its range is 8,000 m. Its passive radar guidance brings it close to the target which is destroyed by a proximity fuse fired by an infrared cell fitted to the missile. The launcher carries 2 groups of 4 missiles.

France and Germany have been jointly examining the *Jason*, a naval version of the *Roland* missile. West Germany developed the *Ram* in cooperation with the United States; this is a missile designed to destroy surface-to-surface anti-ship missiles. Its length is 2.8 m, its diameter 0.13 m, and its launching weight is 71 kg with a range of 5 km. Its speed in flight can reach Mach 3. For its part, Italy has developed the *Albatross*, and the second version, the Mk 2 can be used against aeroplanes and anti-ship missiles.

Great Britain has an impressive array of surface-to-air missiles. First, the medium range system, *Sea Dart*: this missile proved itself very effective against the Argentinian aircraft during the Falkland Islands war. With a length of 4.4 m, a diameter of 0.4 m and a wingspan of 0.9 metres, the *Sea Dart* has a weight on launching of 550 kg, and a range of about 80 km. The size of the British *Sea Slug* is

even more impressive. It is 5.9 m long, 0.4 m in diameter and its wingspan is 1.6 m; while its weight on launching is 2,000 kg. Nevertheless its range is slightly lower: 50 km at Mach 1.8. As for the *Sea Wolf*, it is a formidable interceptor of anti-ship missiles. This device has a short range, only 5 km; its length is 1.9 m, its diameter 0.3 m and its wingspan is 0.5 m, while its weight on launching is 82 kg. It is fitted to frigates of the *Broadsword* class. A radar guidance system follows the target and gives the *Sea Wolf* all the information it requires for interception. Another short range system is the *Sea Cat*. This is propelled by a two-stage motor, and uses passive radar guidance.

After numerous design studies and development work on the *Little Joe*, *Little Lark*, *Bumblebee*, *Talos* and *Typhoon*, the United States perfected the *Standard* Missile. It was made in a number of versions, their ranges varying between 30 and 121 km. Recently the US Navy has instigated studies into the possibility of giving the SM-2 model a nuclear warhead to neutralize the threat posed by a salvo of numerous anti-ship missiles.

The *Sea Sparrow* is a short range missile with a very short reaction time. Its design is based on a modified version of the *Sparrow 3* air-to-air model. Its length is 3.7 m, its diameter 0.6 m, and its range, covered at a maximum speed of Mach 3.5 is 11 km.

The *Sea Sparrow* is also known as the Point Defence Missile System and is used for close-in air defence. It became operational in 1969 and is now mounted on attack carriers, ocean escorts and amphibious assault ships. *Sea Sparrow* also forms part of the new vertical launch systems (VLS) which had its first successful sea demonstration in 1981 from Canadian destroyer HMCS *Huron*. The basic aim of SVLS is to provide air defence to small ships.



# The Warsaw Pact

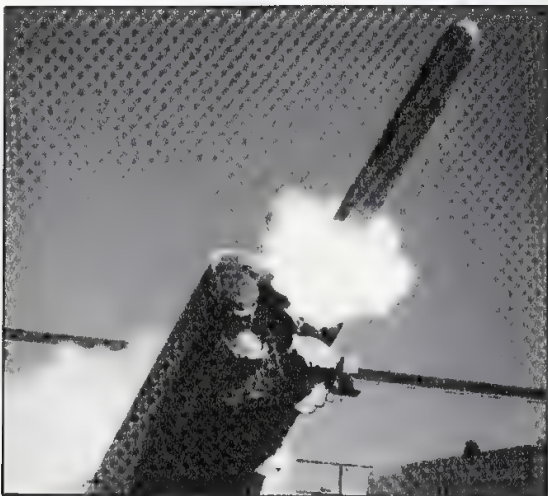
NATO observers believe that the SA-N-Goa, which was the first Soviet naval surface-to-air missile, is the SAM version for large ships of the SA-3 Goa ground-to-air missile. Its characteristics are the same: length 6.5 m, diameter 0.7 m, wingspan 1.5 m, weight 400 kg and range about 30 km. For its part, the SA-N-2 has the same characteristics as the SA-2 *Guideline*. Its length is 11 m, its diameter 0.70 m, its wingspan 2.2 m, its weight 2,300 kg and its maximum range 50 km. It is not known whether this missile is still in service. On the other hand, it is certain that the SA-N-3 *Goblet* is fitted to the *Kiev* class of aircraft carrier. Its range is about 3 km, and it has a conventional warhead of 60 kg.

The SA-N-4 is a short range missile, about 10 km, and is fitted to more than 100 Soviet ships of all kinds. The SA-N-4 can be launched in groups at several different targets. They have a pursuit radar and manual tele-guidance. The SA-N-5, 6, and 7 are naval versions of ground-to-air missiles, the SA-7 *Grail*, SA-10 and SA-11 respectively. These are short range missiles, with a range of approximately 20 to 80 km.

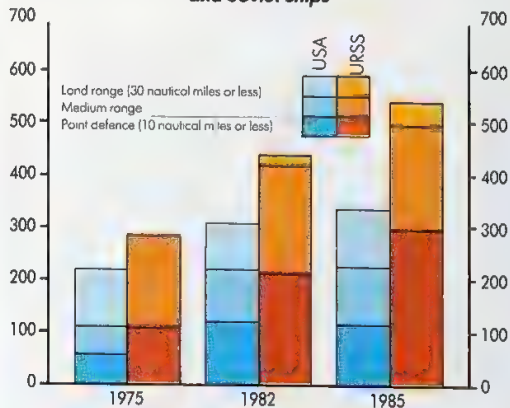
*Top right* Battery of SA-N-1 missiles on board a Soviet *Krivak* class guided-missile frigate.

*Right* Test firing of an American *Tomahawk* cruise missile.

*Below* M-4 French missile. *Inset* Firing a *Harpoon* missile.



**Surface-to-air missile launchers fitted to American and Soviet ships**



1 Including aircraft carriers, cruisers, destroyers and frigates.

2 Counting each arm

# ANTI-SUBMARINE MISSILES

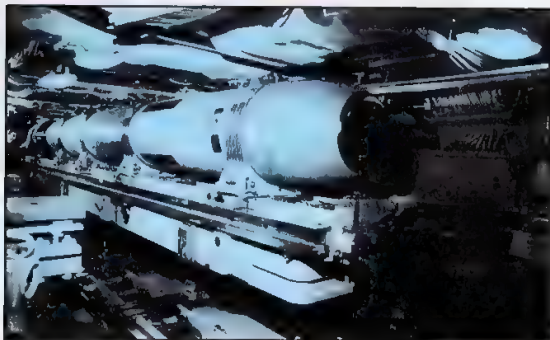
## The Atlantic Alliance

Anti-submarine warfare has developed out of all recognition since the days of the old depth-charge. Following on from guided torpedoes we have the ASW (Anti-Submarine Warfare) missiles. This device is made up of a bomb with either a conventional or nuclear warhead and fuzing mechanism. Their purpose is to get the charge to explode as near as possible to the submarine in order to crush it. The guided torpedo, still frequently used, penetrates the shell of the submarine.

France developed the *Malafon* in 1956. This device, which is 6.2 m. long, 0.65 m in diameter and with a wingspan of 3.3 m, is a radio-controlled cruise missile carrying an automatically guided torpedo. The *Malafon* can reach a speed of 800 km/h, and has a range of 13 km. The system has been considerably modified and modernised since it first appeared. It is interesting to examine the course of this missile before explosion. The *Malafon* is fired in the direction of the last contact with the target. The weapon then flies at an altitude of 100 m, under radio

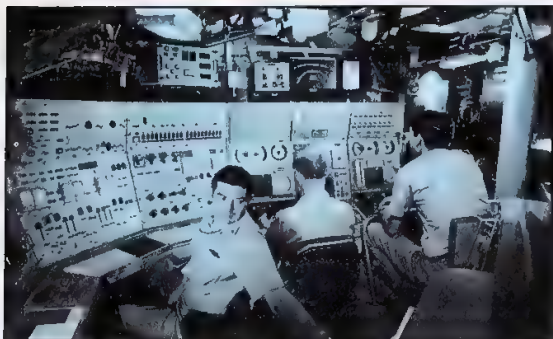
control. A few hundred metres from the last recorded position of the target, a braking parachute comes into action. The 500 kg torpedo is separated from its propellant and enters the water where, using its own sonar system, it pursues the target. When it is as close as possible to the enemy submarine a proximity fuse detonates the warhead.

The United States has developed several models. The first three the *Rat*, *Petrel* and *Grebe* were abandoned at the development stage. Two anti-submarine missiles are operational today: the *Asroc* and the *Subroc*. The *Asroc* consists of a launch booster installation, a parachute and a depth charge which can be either conventional or nuclear. The length of the rocket is 4.5 m, its diameter is 0.3 m and its wingspan 0.8 m. Its launching weight is 400 kg and its range about 10 km. The *Subroc* is 6.25 m in length, 0.5 m in diameter and weighs nearly 2 tonnes; it is a missile launched like a tornado from an attack submarine through standard 533 mm tubes. Its range is about 60 km. After firing, it comes to the surface and then, at supersonic speed, it follows the same course as missiles fired from ships. Its guidance system, which is very efficient, makes this a formidable weapon. Each submarine so equipped carries half a dozen *Subroc*.



## The Warsaw Pact

The West has not succeeded in learning the secrets of Russian anti-submarine weapons, and so NATO specialists can only make a few hypotheses. The main Soviet missile has been called the SS-N-14; but details of its characteristics are not known. All that is known is that it has a nuclear warhead which would make it the Soviet equivalent of the American *Subroc*.

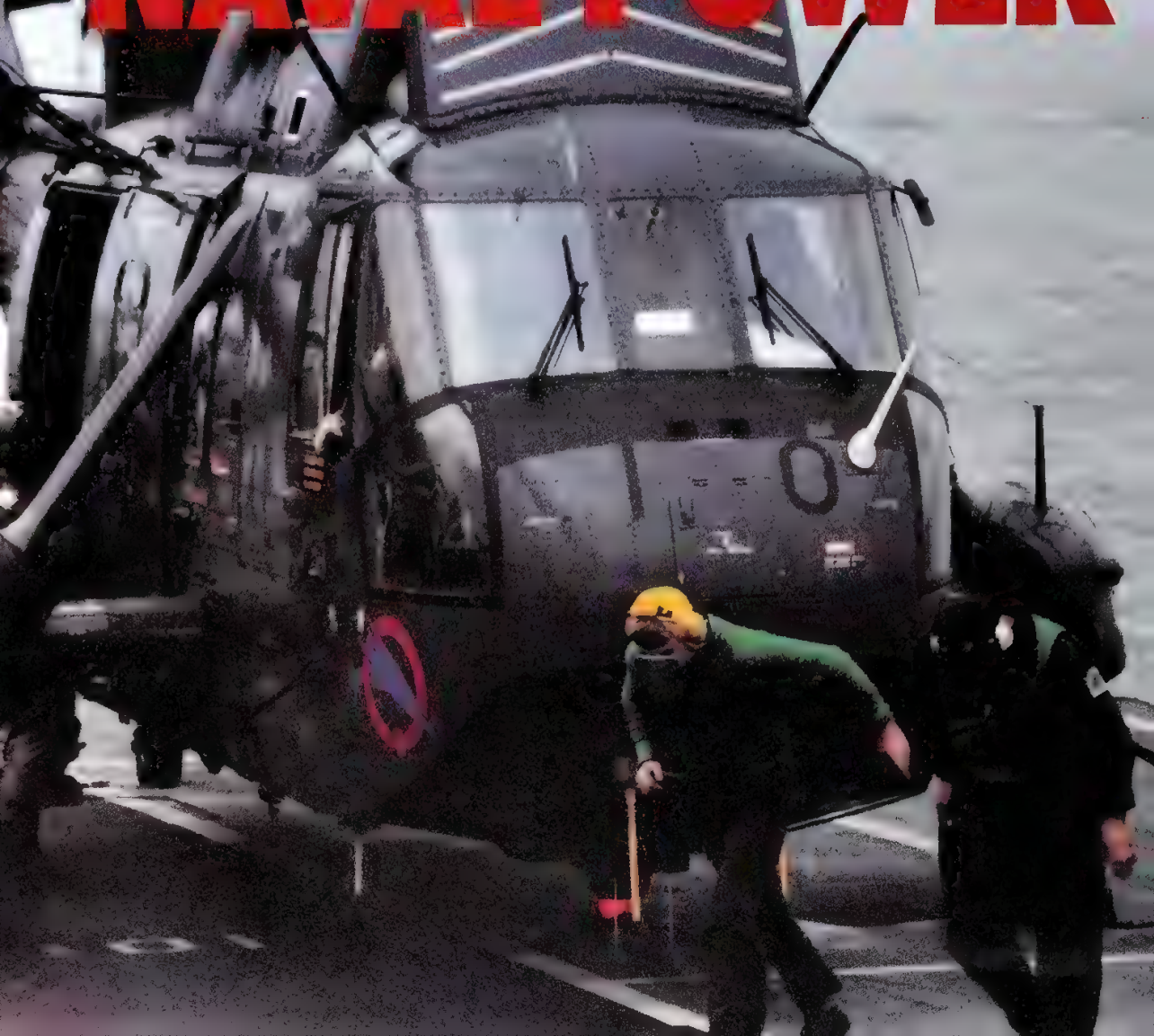


Top Torpedo room in the *USS Ohio*. Above Control room in the *USS Ohio*, working round the clock. Right ASROC being fired.





# THE BALANCE OF NAVAL POWER





# THE WARSAW PACT AGAINST NATO

*Overall it can be said that the NATO alliance still has supremacy at sea. The striking power of the American aircraft carriers continues to cause great concern in Moscow, and for many years the Soviet Union has been trying to bridge the gap between itself and the western nations. This naval expansion has been so frantic that the Reagan administration felt it necessary to react rapidly to keep, even increase, its lead over the East. The naval forces of the member countries of the Atlantic Alliance and France, enable Washington and NATO to keep mastery of the seas, a mastery which can, however, be put in doubt if the Soviets go on with their intensive policy of building warships. Here we examine the line-up of the navies of the two alliances.*





# THE WARSAW PACT COUNTRIES

## BULGARIA

**Manpower:** 8,500 men (3,000 conscripted).

**Combat fleet:** 2 traditional attack submarines of the Soviet *Romeo* type. 2 frigates of the Soviet *Riga* type. 3 corvettes of the Soviet *Poti* type. 5 missile launching patrol boats, 2 of the Soviet *Osa 2* class and 3 of the *Osa 1*. 7 torpedo boats of the Soviet *Shersten* type. 25 patrol boats: 6 inshore submarine hunters of the Soviet SO1 type. 5 fast patrol boats of the Soviet *Zhuk* type and 14 inshore surveillance ships of the PO2 type. 10 mine sweepers, 4 inshore mine sweepers of the Soviet *Vanya* type. 2 mid-ocean mine sweepers of the Soviet T43 type and 4 mine disposal boats of the Soviet *Yevgenya* type.

**Amphibious fleet:** 28 large landing barges.

**Fleet air arm:** 8 helicopters for jamming communications, 6 of the Mi-4 *Hound* type and 2 Mi-8 *Haze* type.

**Reserve:** 25,000 men.

## CZECHOSLOVAKIA

**Manpower:** None.

## HUNGARY

**Manpower:** None.

## POLAND

**Manpower:** 22,000 men (5,000 conscripted).

**Combat fleet:** 4 conventional attack submarines of the Soviet *Whisky* type. 1 missile launching destroyer of the *Ko* type. 13 missile launching patrol boats, 2 of the Soviet *Osa 1* type. 15 MTB's of the *Wisla* type. 5 inshore surveillance patrol boats of the *Obluze 2* type. 23 ocean-going mine sweepers of the T43 and *Krogulec* types. 25 small draught mine sweepers of the K8 and *Notek* types. 42 patrol boats for coastal surveillance.

**Amphibious fleet:** 22 medium landing boats of the *Polnocny* type. 4 small personnel landing craft.

**On order:** Mine sweepers.

**Fleet air arm:** 46 Mig-17 *Fresco* fighter-bombers, 11 AN-2 transport planes, 15 Mi-2 *Hare* helicopters, 6 Mi-5 *Hound* helicopters, 6 Mi-14 *Haze* and 5 *Hound A* helicopters on anti-submarine patrol.



## EAST GERMANY

**Manpower:** 14,000 men (8,000 conscripted).

**Combat fleet:** 2 anti-submarine frigates of the Soviet *Koni* type. 14 anti-submarine corvettes, 8 of the *Parchim* type and 6 of the *Hai 3* type. 15 missile launching patrol boats, of the Soviet *Osa 1* type. 18 MTBs of the *Shersten* type. 31 small MTB's of the *Libelle* type. 46 small draught minesweepers of the *Kondor 1* and 2 types.

**Amphibious fleet:** 12 large tank landing ships.

**Fleet air arm:** 8 Mi-14 *Haze*, 21 Mi-8 *Hip* helicopters.

**Reserve:** 25,000 men.

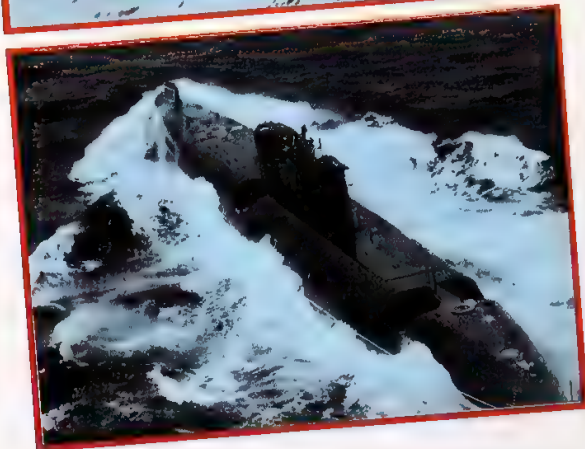
## RUMANIA

**Manpower:** 7,500 men (3,500 conscripted).

**Combat fleet:** 1 *Tetal* type frigate. 3 anti-submarine corvettes of the Soviet *Poti* type. 5 missile launching patrol boats of the Soviet *Osa 1* type. 7 large MTB's of the *Epitrop* type. 17 hydrofoils of the Chinese *Huchwan* type. 5 submarine patrol boats of the *Kronstadt* type and 15 smaller patrol boats of the *Shanghai 2* type. 1 mine layer of the *Cosar* type. 16 mine sweepers of the M40 German and T301 Soviet types.

**Amphibious fleet:** 8 *Braila* type landing barges.

**On order:** 3 ex-Soviet *Whisky* class submarines and 1 destroyer.



**Fleet air arm:** 6 anti-submarine Mi-14 Haze helicopters.  
**Reserves:** 20,000 men.

## THE SOVIET UNION

**Manpower:** 460,000 men (345,000 conscripted).

**Combat fleet:** 67 strategic, nuclear-propelled, *Delta*, *Yankee*, *Hotel* and *Typhoon* type submarines. 15 conventionally propelled, rocket-launching submarines of the *Golf* types 2, 3 and 5. 48 nuclear-propelled submarines equipped with cruise-type missiles of the *Oscar*, *Papa*, *Charlie* and *Echo* types. 17 conventionally powered submarines, fitted with cruise missiles, of the *Juliet* and *Long Bin* types. 70 nuclear-propelled attack submarines of the *Alfa*, *Victor*, *November*, *Echo* and *Yankee* types. 159 conventional attack submarines, of the *Kilo*, *Tango*, *Foxtrot* and *Romeo* types. A total of 376 submarines.

Three *Kiev*-type aircraft carriers with submarine-hunting facilities and also equipped with the latest surface-to-air missiles. 2 *Moskva*-type helicopter carrying cruisers. 27 guided missile cruisers, 2 with nuclear propulsion of the *Kirov* type, 3 CGM of the *Slava* type. 11 light command cruisers. 105 destroyers of every type; guided-missile destroyers of the *Udaloy* type, surface-to-air missile destroyers of the *Sovremenny* type. 99 frigates including 37 submarine hunters, of the *Riga* type, 61 light destroyers, 131 *Pauk* and *Poti* type corvettes for anti-submarine work. 27 surface-

to-surface missile launching corvettes of the *Wanushka* type. 100 surface-to-surface missile-launching patrol boats. 62 hydrofoils. 194 rapid patrol boats or coastal surveillance boats, 355 mine layers, mine hunters and mine sweepers. **Amphibious fleet:** 30 large tank landing craft. 1 LST, 50 medium landing craft.

**On order:** New generation of *Typhoon* class SSBN, numerous nuclear and conventionally propelled submarines. 1 aircraft carrier of the *Kiev* class. 3 nuclear-powered missile-launching cruisers of the *Kirov* type, as well as every type of surface ship.

**Fleet air arm:** 1,400 aircraft. Among which are: reconnaissance machines, 87 *Badger*, 45 *Bear* and 6 *Blinder*; bombers: 85 *Backfire*, 270 *Badger* and 40 *Blinder*; attack aircraft: 55 *Forger* and 40 *Fitter*; anti-submarine warfare: 50 *Bear*, 90 *Mail*, 50 *May*, 250 anti-submarine and reconnaissance helicopters of the *Hormone*, *Haze* and *Helix* A types.

**Marine Infantry:** 14,500 men.



# THE ATLANTIC ALLIANCE COUNTRIES

## BELGIUM

**Manpower:** 4,550 men (1,035 conscripted).

**Combat fleet:** 4 type E 71 frigates, *Westhinder* class. 7 ocean-going mine sweepers of the MSO type. 6 inshore mine sweepers of the MH and MSC types. 14 shallow draught mine sweepers and 2 support ships for use as fishery protection vessels.

**Fleet air arm:** 3 *Alouette* 3B and 2 *Sikorsky* S-58 helicopters.

**Reserves:** 4,500 men.

## CANADA

**Manpower:** 18,450 men.

**Combat fleet:** 3 British *Oberon*-class attack submarines with conventional propulsion. 4 DD-280 destroyers for anti-submarine work, each equipped with 2 *Sea King* helicopters. 16 anti-submarine and helicopter-carrying DDH and DDE frigates. 12 coastal patrol boats.

**Fleet air arm:** 32 sea-borne helicopters carried on all combat ships for anti-submarine defence.

**Deployment:** Atlantic: 3 SS submarines, 13 surface ships and 2 support ships. Pacific: 10 surface ships and 1 support craft.

**Reserves:** 3,250 men.

## DENMARK

**Manpower:** 5,800 men (1,300 conscripted).

**Combat fleet:** 5 SS class attack submarines, 2 German type 205 and 3 *Delfinen* type. 10 anti-submarine frigates, 2 of the *Peder Skram* type, 3 KV72 type *Niels Juel* class, 4 *Hvidbjørnen* type and 1 of the same type modified. 10 surface-to-surface missile-equipped MTBs, derived from the Swedish *Spica* type. 6 MTB's of the British *Brave* type. 7 mine layers, 4 of the *Falster* type, 2 *Lindormen*, 1 *Langeland*. 22 patrol boats. 5 inshore mine sweepers of the American *Adjutant* type.

**On order:** 4 type 210 submarines.

**Fleet air arm:** 8 *Lynx* and 8 *Alouette* helicopters.

**Reserves:** 3,800 men. National guard: 5,200 men.

## THE UNITED STATES

**Manpower:** 569,000 men.

**Combat fleet:** 34 strategic nuclear-powered submarines of



the *Ohio*, *Lafayette* and *Benjamin Franklin* classes (converted to *Trident 1* (SLBM) or *Poseidon*). 91 nuclear-powered attack submarines, 41 of the *Los Angeles*, 37 *Sturgeon* and 13 *Thresher-Permit* classes and 5 conventional attack submarines, 3 of the *Barbel* class, 1 of the SCB type and 1 ACB 116. 4 nuclear-powered aircraft carriers of large tonnage, 3 *Nimitz* type and 1 SCB 160. 10 fleet aircraft carriers of large tonnage and assorted aircraft: 1 SCB 237CJ. *F. Kennedy*, 3 *Kitty Hawk* class 4 *Forrestal* class and 2 *Midway* class. 1 BB line battle ship *New Jersey*, 9 nuclear-powered missile cruisers 4 of the *Virginia* class, 2 of the *California* class. 19 missile cruisers, 10 of the *Ticonderoga* class and 9 of the *Belknap* class. 41 destroyers, 14 of the *Forrest Sherman* type and 50 of the *Oliver Hazard Perry* class. 88 anti-submarine frigates, of which several are equipped with surface-to-air missiles. 21 mine sweepers.

**Amphibious fleet:** 2 command ships. 5 assault ships with flight deck, of the LHD type. 7 assault helicopter carriers. 14 ships for carrying barges and personnel. 13 troop barges, some equipped with flight deck. 20 tank transporters.

**Fleet air arm:** 4,500 aircraft in service. The US Navy has 64 attack and interceptor squadrons, 6 reconnaissance squadrons, 26 helicopter squadrons, 22 anti-submarine squadrons, 40 squadrons of assorted types and 26 marine



patrol flotillas. The Corps of Marines is arranged into 25 attack and interception squadrons, 23 helicopter squadrons and 16 mixed duty squadrons. The main equipment consists of F/A18 *Hornet*, F-14 A *Tomcat*, F-4 *Phantom*, A-4M *Skyhawk*, A-6E *Intruder*, AV-8 *Harrier*, A-7E *Corsair* 2, S-3A *Viking*, RF-8G *Crusader*, EA-3B *Skywarrior*, EA-6B *Prowler*, E-2C *Hawkeye* and P-3C *Orion*. Airborne helicopters are the Sikorsky SH-3A, 2F, 60, 46, Bell UH-1E, AH-1G.

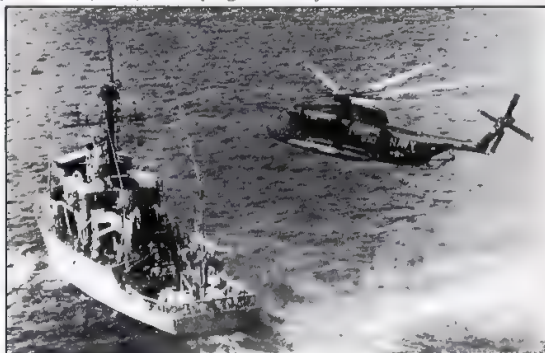
**The Corps of Marines:** 194,600 men in three divisions.

**Reserves:** 87,900 men and 42,000 marines.

## GREAT BRITAIN

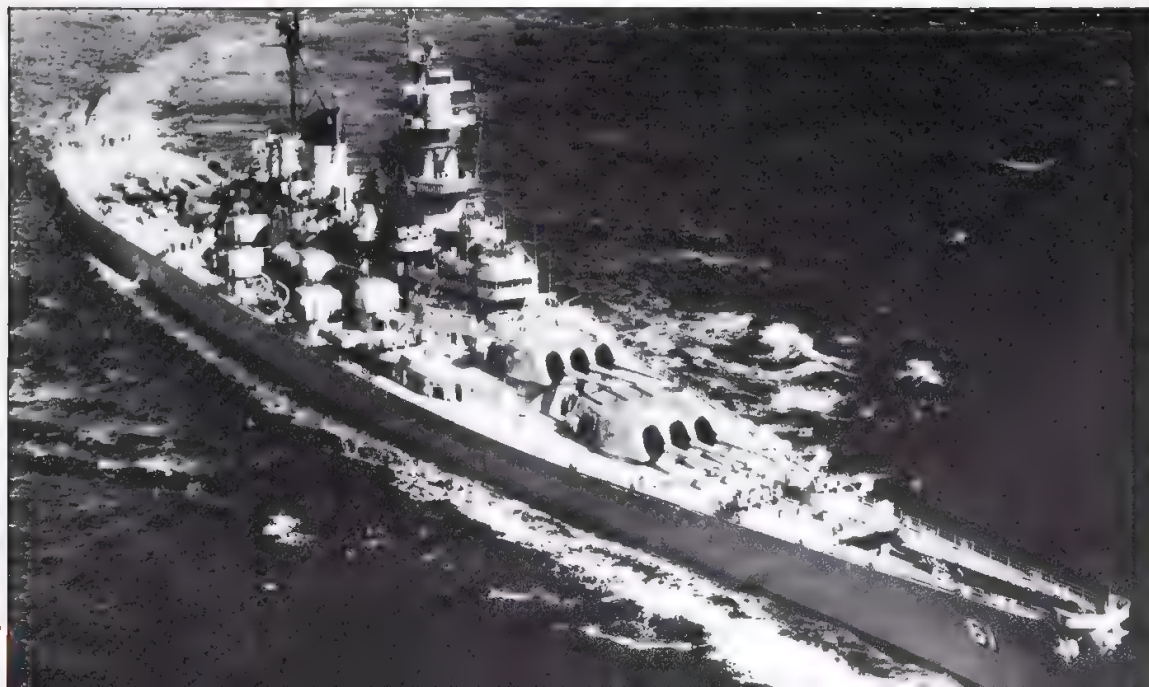
**Manpower:** 71,727 men (including Fleet Air Arm and Royal Marines).

**Combat fleet:** 4 strategic nuclear-powered submarines (SSBN) of the *Resolution* class, each fitted with 16 Polaris A3 missiles. 27 attack submarines of which 12 are nuclear powered (SSN), 1 *Trafalgar*, 6 *Swiftsure*, 3 *Churchill* and 2



Left American aircraft carrier USS John F. Kennedy. Below The battleship *Iowa*, recommissioned during 1984.

Above American mine sweeper.









The face of British naval power. *Left* A Royal Navy submarine of the *Swiftsure*-class. *Inset* An *Invincible*-class aircraft carrier. *Above HMS Brilliant*, a Type 22 frigate – one of the Royal Navy's 47 frigates.

*Valiant*, and 15 conventional submarines (SS), 13 *Oberon* and 2 *Porpoise*. 3 Aircraft carriers of the *Invincible* and *Hermes* classes. 3 CLG (missile launching) cruisers, 1 of D23 *Bristol* class and 2 of the *County* class, D 19 and D20. 12 guided-missile destroyers DDG 4 of extended type 42 and 8 *Sheffield* class type 42. 47 frigates of types 22, 21, 12, *Tribal* and *Whitby*. 23 MTBs of the PB and PBF types. 36 mine sweepers, 1 mine layer, the N21 *Abdiel*.

**Amphibious fleet:** 2 LPD Landing ship for personnel and helicopters. 4 LST (tank landing ships) and 2 LCT (small transport — 5 tanks of 70 tonnes and 35 soldiers).

**Fleet in reserve or in course of transformation:** 1 ballistic missile submarine (SSBN). 2 nuclear-powered attack submarine. 3 conventional attack submarines and 8 frigates.

**On order:** 1 aircraft carrier, 4 nuclear-powered *Trafalgar* class attack submarines, 3 type 42 destroyers. 8 type 22 frigates, 6 mine sweepers.

**Fleet Air Arm:** 3 attack squadrons equipped with 15 *Sea Harrier* (attack-interception) 34 *Nimrod* Mk2 (marine patrol) and 167 helicopters of different types, including *Wasp*, *Lynx* WG-13, *Wessex* HAS 1 Mk3, *Wessex* HAS 1 Mk 5, *Sea King* HAS Mk2 and Mk5 and *Sea King* HAS Mk 4.

**On order:** 14 *Sea Harrier*, 18 *Sea King* HAS Mk5, 8 *Sea King* HAS Mk4 and 13 *Lynx* HAS-3.

**Royal Marines manpower:** 7,754.

**Reserves:** (overall) 25,970 men in the active reserve and 6,700 men in the volunteer reserve.

## GREECE

**Manpower:** 19,500 men (12,000 conscripted).

**Combat fleet:** 10 conventional attack submarines. 8 of the German 209 and 209/1 type, 1 American *Guppy* 3 and 1 *Guppy* 2. 14 Modernised destroyers of the American *Gearing* FRAM 1 and FRAM 2 types and *Fletcher* type. 7 frigates, 2 of the Dutch Kortenaer type, 4 ex-DE American and 1 *Rhein*. 14 PBF-GS guided-missile patrol boats of the *Combattante* 2 and *Combattante* 3 types. 8 MTBs. 2 mine layers, the N04 *Aktion* and the N05 *Amvrakia*. 14 coastal mine sweepers.

**Amphibious fleet:** 1 landing barge transporter, 7 ships for landing armour, 5 smaller landing craft, 6 large American landing barges.

**Fleet air arm:** 4 anti-submarine *Alouette* 3 helicopters, and mixed air-naval crews equipped with 14 hydrofoils of the Grumman HU-16 B class for anti-submarine warfare. 10 AB212 helicopters.

**Reserves:** about 24,000 men.

## ITALY

**Manpower:** 44,500 men (23,700 conscripted).

**Combat fleet:** 10 conventional attack submarines (SS), 4 *Sauro* type, 4 *Bagnolini* type and 2 American *Tang*. 1 guided-missile cruiser, the *Vittorio Veneto*, equipped with 9 AB-212 helicopters. 2 missile-launching cruisers of the *Andrea Doria* type equipped with 4 AB-212 helicopters. 4 guided-missile destroyers, 2 of the *Audace* type with 2 AB-212 helicopters and 2 of the *Impavido* type. 14 frigates also equipped with 2 AB-212 helicopters, 6 of the *Maestrale* type, 4 of the *Lupo* type, 2 of the *Alpino* type and 2 of the *Canopo* type. 8 corvettes, 4 *De Cristofaro* and 4





Top The American aircraft carrier USS Enterprise. Above An aeroplane has missed its landing on the deck of the USS Nimitz where the rescue teams are being organised.

*Albatross*, 4 ocean-going mine sweepers and 22 coastal mine sweepers, 4 gun boats and 6 hydrofoils.

**On order:** 2 conventional *Sauro* type attack submarines. 1 aircraft carrier. 2 destroyers of the *Audace* type. 5 *Maestrale* frigates, 1 mine sweeper, 6 SH-3D and 9 AB-212 helicopters.

**Fleet Air Arm:** 5 anti-submarine squadrons, 2 with 30 Sikorsky SH-3D helicopters, 1 with 10 AB-204 AS and 2 combining 53 AB-212 helicopters.

**Reserves:** 221,000 men.

## NORWAY

**Manpower:** 8,850 men.

**Combat fleet:** 15 conventional attack submarines, of the German U4 type. 5 anti-submarine frigates of the *Oslo*-class. 2 *Sleipner* class anti-submarine corvettes. 1 patrol boat, former whaler, the *Vadsø*. 39 guided-missile patrol boats, 6 of the *Snøgg* type, 14 of the *Hawk* type and 19 of the *Storm* type. 3 mine layers, 2 *Vidar* type and 1 *Borgen*. 10 coastal mine sweepers of the American *Falcon* type.

**Amphibious fleet:** 7 ships for carrying tanks and personnel. Each can carry 5 Leopard 1 tanks and from 80 to 180 men.

**On order:** 6 conventional attack type 210 submarines.

**Fleet air arm:** None.

**Reserves:** 16,000 men.

## HOLLAND

**Manpower:** 17,350 men (1,250 conscripted).

**Combat fleet:** 6 conventional attack submarines, 2 of the *Zwaardvis* and 4 *Dolfij* types. 2 guided missile destroyers of the *Tromp* type. 16 anti-submarine frigates, 10 of the *Kortenaer* and 6 of the *van Speijk* types. 6 *Wolf* type anti-submarine corvettes. 5 *Balder* type patrol boats for coastal defence. 14 mine sweepers of the *Tropartite*, *Dokkum* and modified *Dokkum* types. 16 *van Straelen* type estuary mine sweepers.

**Amphibious fleet:** 10 Landing assault craft.

**On order:** 2 *Walrus*-type submarines. 5 frigates, 3 of the *Kortenaer* type, 13 mine sweepers.

**Fleet Air Arm:** 3 squadrons made up of 6 SP-13H *Atlantic*, gradually being replaced by P-3C *Orion* and two Fokker F 27. 10 AH-12 *Wasp* and 24 WG-13 *Lynx* helicopters of which most are intended for anti-submarine warfare.

**Reserves:** about 20,000 men.

## PORTUGAL

**Manpower:** 13,000 men including naval fusiliers (5,200 conscripted).

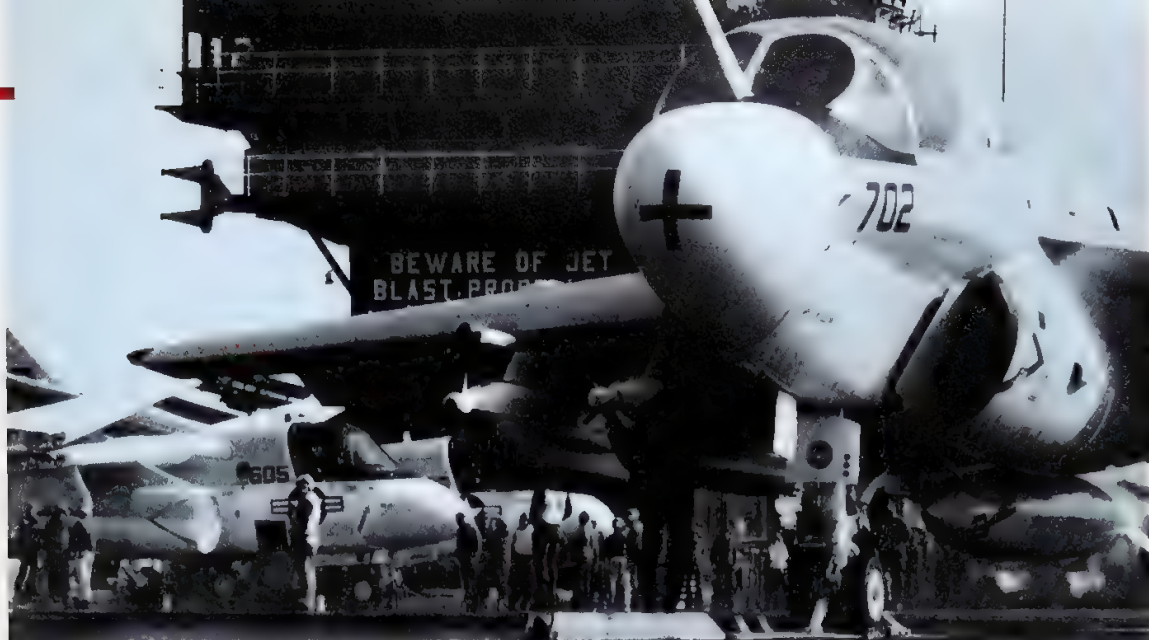
**Combat fleet:** 3 conventional attack submarines, 2 of the French *Daphne* class. 7 frigates, 4 French *Commandant Riviere* type, 3 American *Dealey* type. 10 anti-submarine corvettes, 4 of the *Baptista de Andrade* type and 6 of the *Joao Coutinho* type, 19 coastal patrol vessels, 2 *Aleixo*, 14 *Albatroz*, 2 *Bonanca* and 1 *River*. 4 coastal mine sweepers.

**Amphibious fleet:** 2 LCT, 11 LCM (for transporting combat armour) and 1 LCA.

## WEST GERMANY

**Manpower:** 36,400 men (11,000 conscripted).

**Combat fleet:** 24 conventional attack submarines, 18 of the



A US EA-6B *Prowler* shortly before being catapulted from the flight deck.

206 type and 6 of the 205 type. 7 destroyers, 3 equipped with surface-to-air missiles, of the American *Charles F. Adams* class and 4 equipped with surface-to-surface missiles of the *Hamburg* type. 7 anti-submarine warfare frigates of the *Bremen* and *Köln* types. 5 anti-submarine corvettes of the *Thetis* type. 39 type 143 and 148 missile-armed patrol boats. 39 mine sweepers and inshore mine sweepers. 18 inshore mine sweepers of the 393 and 394 types.

**Amphibious fleet:** 22 large landing barges, for transport of tanks and of personnel. 29 armoured landing barges.

**On order:** 3 frigates, 7 missile-armed patrol boats

**Fleet air arm:** 2 squadrons of F-104 G *Starfighter* interceptors (95 aircraft) and 25 RF-104 G reconnaissance planes. 34 *Tornado*, 12 *Sea Lynx* Mk 88 and 22 *Sea King* Mk 41. On order 78 *Tornado*.

## LUXEMBOURG

**Manpower:** Nil.

## ICELAND

**Manpower:** 160 coast guards.

**Combat fleet:** 6 fishery protection vessels of the *Aegir*, *Odinn*, *Thor* and *Arvakur* types.

**Fleet air arm:** 2 Fokker F-27, 2 Bell 47G and 1 Hughes Helicopter.

## TURKEY

**Manpower:** 46,000 men (36,000 conscripted).

**Combat fleet:** 15 conventional attack class submarines, 4 of the German 209 class, 11 of the American *Tang*, *Guppy* 2 and 3 classes. 16 destroyers, 8 of the American *Gearing* type. 2 *Berk* type frigates each with 1 helicopter. 8 *Kartal* FPB-57 type missile-armed patrol boats. 12 MTBs, 5 of the *Kartal* type and 7 of the German S-141 type. 28 patrol boats, 3 rapid. 11 submarine chasers, and 14 coastal patrol boats. 9 mine layers of the American type MMC (ex-LST). 26 inshore mine sweepers.

**Amphibious fleet:** 4 large tank transporters, 29 LCT, 4 American LCU (landing barges for men and tanks), 20 small landing barges.

**On order:** 1 conventional attack submarine, 4 frigates, 13 LCT.

**Reserves:** 70,000 men.

## SPAIN

**Manpower:** 54,000 men (44,000 conscripted).

**Combat fleet:** 7 conventional attack submarines, 2 of the French *Agosta* type, 4 of the French *Daphne* type, 1 American *Guppy* 2 type. 1 aircraft carrier, the *Delado*, a former light American aircraft carrier. 11 destroyers, 1 of the *Oquendo* type, 5 American *Gearing* type, and 5 ex-American *Fletcher* type. 11 anti-submarine frigates, 5 of the *Balearic* type and 6 of the *Descubierta* type, 5 anti-submarine corvettes of the *Atrevida* type. 27 patrol boats, 6 rapid FPB of the *Lazaga* type, 6 PCL of the *Barcelo* type, 6 coastal surveillance boats of the *Anaga* class. 4 ocean-going mine sweepers of the American *Aggressive* type, 6 inshore mine sweepers of the American *Adjutant* and *Redwing* types.

**Amphibious fleet:** ex-American material including 2 personnel transports, 1 tank landing ship, 3 large tank landing craft and about 100 landing boats of every type.

**On order:** 4 *Agosta*-type submarines, 1 aircraft carrier, 2 destroyers, 8 frigates, 8 mine sweepers.

**Fleet air arm:** 12 AB 212 helicopters for transport and attack, 14 *Sea King* helicopters for anti-submarine warfare, 11 Hughes 500 M on destroyers, 4 Bell AH-1G assault helicopters.

## FRANCE

**Manpower:** 68,300 men (17,700 conscripted).

**Combat fleet:** 5 Strategic nuclear-powered submarines (SSBN) of the *Redoutable* class. A sixth of the *Inflexible* class – will come into service during 1985. 18 attack submarines. 1 nuclear submarine of the *Rubis* class and 17 conventional (SS) submarines, 4 of the *Agosta* type, 4 of



the *Narval* type and 9 of the *Daphne* type. 2 aircraft carriers of the *Clemenceau* type and 1 helicopter carrier of the *Jeanne d'Arc* type equipped with 8 *Lynx*. 1 guided-missile cruiser of the *Colbert* type. 2 missile-armed anti-aircraft frigates of the *Suffren* type. 4 anti-aircraft corvettes of the C-70 AA type. 2 missile launching, anti-aircraft squadron escorts of the T47 type. 3 F-67 anti-submarine frigates. 7 C-70 anti-submarine corvettes. 6 anti-submarine squadron escorts of the modified T53 type and the rebuilt T 47 class. 9 gun-boat escorts of the *Commandant Rivière* and *Balny* types. 15 A69 gunboats. 18 patrol boats, 6 *Supra-Patra*, 4 ex-Canadian coastal mine sweepers, 5 ex-mine-sweepers of the British *Ham* type, 24 mine hunters, 15 of the *Tripartite* class and 5 coastal D minesweepers.

**Amphibious fleet:** 2 landing barge transporters, the *Oura-gan* and *Orage*. 5 tank landing craft. 14 light transports (BATRAL). 11 infantry and tank landing craft. 21 transport barges.

**On order:** 5 nuclear-powered attack submarines, 5 anti-

aircraft corvettes of the C-70 class, 3 A-69 frigates, 12 mine-sweepers.

**Fleet air arm:** the aerial units belonging to the fleet are of two types: the carrier-borne and the marine patrol and anti-aircraft forces based on land. The total fleet consists of 167 combat or reconnaissance aircraft and 41 helicopters. They include: 16 F-8E *Crusader* (interceptors), 36 *Super-Etendard* (aerial cover) 8 IVP, *Etendard* (reconnaissance), 17 *Alizé* (safety). 5 P-2H *Neptune* are land-based as are 27 Breguet *Atlantique* Mk 1. The ship-borne helicopters are the *Alouette 3* (anti-submarine warfare), 13 *Super-Frelon* and 19 *Lynx*.

**Reserves:** 64,000 men.

**Bases:** Cherbourg – Channel Fleet.

Brest – Main Atlantic base; SSBN base.

Lorient – Atlantic submarine base.

Toulon – Main Mediterranean Fleet base.

**Fleet dispositions:** Mediterranean, Atlantic, the Channel, Indian Ocean, West Indies, Pacific.



French aircraft carrier *Foch* anchored off Toulon. The *Foch* is 265 m long and when fully loaded displaces more than 30,000 tonnes. Her peacetime complement varies between 984 and 1,338. The *Foch* normally carries some 40 aircraft – *Etendard* IVP, *Super Etendard*, F-8E *Crusader*, *Alizé* and *Alouette*. But following her independent line, the *Foch* has not been put at NATO's disposal by the French government.







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